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ABSTRACT

This issue of a research journal on gifted education explores issues surrounding gifted children who also have learning disabilities. Specific articles include: (1) "Notes, Quotes, and Anecdotes" (Francis Cartier); (2) "Gifted Children with Learning Disabilities: A Review of the Issues" (Linda E. Brody and Carol J. Mills), which examines current policies and practices with regard to defining, identifying, and educating gifted children with learning disabilities, and offers recommendations to ensure that these students receive the intervention needed to help them achieve their full potential; (3) "Gifted, LD, and Gifted/LD Children's Understanding of Temporal Sequencing on Television" (Robert Abelman), which found that gifted and gifted children with learning disabilities demonstrated a higher level of comprehension of the basic realistic mode of presentation than typical children and children with learning disabilities; (4) "Characteristics of 12th-Grade Students Seriously Deficient in Spatial Ability" (Carol L. Gohm, Lloyd G. Humphreys, and Grace Yao), which found that students who were unexpectedly low in spatial ability performed relatively well on cognitive tests that required answering unambiguous questions by retrieving information directly from long term memory, whereas they scored relatively poorly on tests requiring inference and perception of relations among novel stimuli; and (5) "Family Therapy with Intellectually and Creatively Gifted Children" (Sidney M. Moon and Alex S. Hall). (Articles include references.) (CR)

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Gifted and Talented and Learning Disabled

Summer 2000

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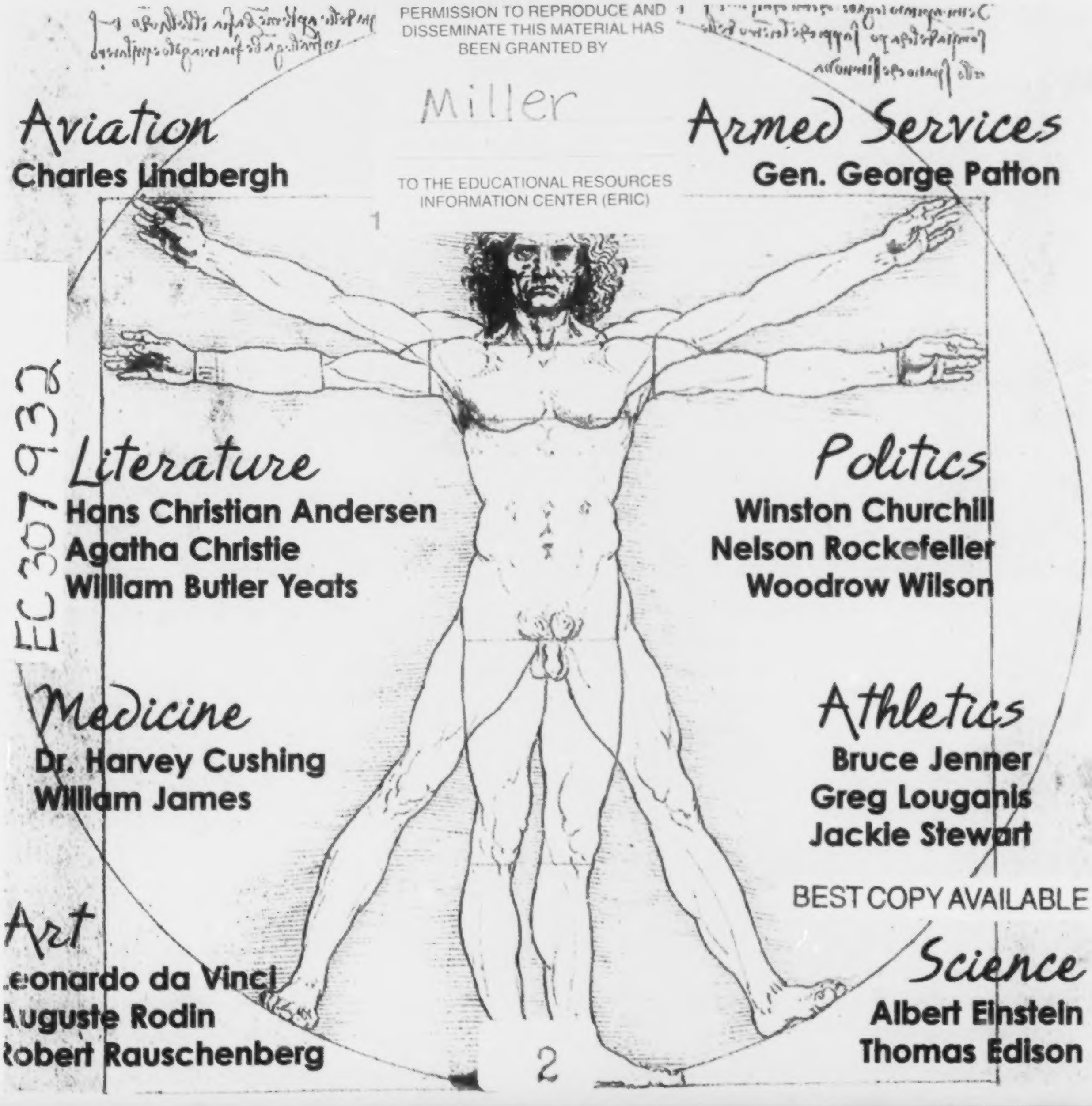

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Editor's Preface

I always knew my daughter was gifted — she taught herself to read by the time she was 4 years old — but it took a while to realize that she also had specific learning disabilities. When her kindergarten teacher complained that she didn't stay within the lines while coloring, I thought that showed her creativity. When she always spilled the milk or juice while pouring it, I thought she was simply being a 3-year-old. However, when her first-grade teacher put her in the slow reading group because her handwriting was so laborious that she could never finish an assignment on time, I thought it was time to do something. Since this was the same first-grade teacher who scolded her for taking home her new reading book after the first day of school and reading the whole thing before dinner (my daughter was astonished to discover that this book was meant to last the entire school year), I thought the something to do would be to speak with the principal about the low level of competence of the teachers in his school.

Eventually I took seriously his suggestion that we have her tested for learning disabilities, and we discovered that my daughter had three specific learning disabilities: eye-hand coordination (so that's why her handwriting is so atrocious!), short-term memory (so that's why her spelling is so atrocious!), and aural perception (so that's why the teacher thinks she is not listening!). Although this knowledge seemed to make no difference to the teachers in her public school (this was about 30 years ago), it made a vast difference to us as parents. By fourth grade she was in private school, where the teachers understood how to bring out her strengths while working to improve her weaknesses.

As the years went by, I met many children, and even college students, whose learning disabilities I could spot immediately. However, because of denial on the part of their parents or lack of interest on the part of their teachers, these disabilities had never been diagnosed or acted upon.

Today I know a number of parents with LD children of different types, and I am delighted to see that the teachers are more knowledgeable about LD, the public schools are more receptive to remedies for the problem, and the parents themselves are more tenacious in their determination to do what is right for their children. Thirty years ago I fought this battle by myself; today there are support groups for parents and children, as well as greater understanding on the part of the public. That's why the articles in this issue of the *Mensa Research Journal* (MRJ) are so important to me personally. To think that respected scholars and researchers are showing an interest in the field of learning disabilities fills me with hope for the many people, adults as well as children, whose potential for living satisfying, intellectual lives, for feeling they are valued members of society, even for achieving genius, may be realized.

Phyllis Miller
Editor

Notes, Quotes, and Anecdotes

If *MRJ* publication dates seem unpredictable, keep in mind that *MRJ*, like nearly all Mensa activities, is edited by volunteers with lives of their own that often seem to interfere both unseasonably and unreasonably. I should also remind you that one reason I have trouble keeping up with current publications is that I have the awful habit of rereading some of my old journals before I throw them in the paper recycling bin.

- In *MRJ #41*, I reminded you that "IQ" tests only indicate aptitude, not necessarily achievement. The concept of aptitude goes back at least as far as the Roman oratory teacher, Quintillian, who considered it a relationship between a person and a particular situation. According to Richard E. Snow in "Aptitude theory: Yesterday, today, and tomorrow," (*Educational Psychologist, 27(1)*, 1992), the Frenchman, Binet, agreed with Quintillian; consider the French word *apropos*. The definition of the English word *aptitude* then gradually changed, through what Snow called "a misinterpretation of Darwinian theory," to refer to general intellectual fitness for any situation. Snow had many other interesting things to say about the evolution of the word *aptitude*, including Anastasi's 1980 arguments for replacing it with *developed ability*, which I would call *achievement*. However, what mainly caught my attention while re-reading Snow is that he never uses the word *versatility*, nor can I recall having seen that word lately in the literature on mental measurement. Have I just missed it, or what? I guess the main point here is that it may be productive for us all to re-examine, from time to time, the words we use, or neglect, when we think and talk about intelligence.

- Along the same lines, here is Barbara O. Taylor, writing in the Phi Delta Kappa *Research Bulletin*, March 1999, about the lack of application of educational research in our schools. "There is no common language," she says, "between university researchers and practitioners, which may explain the lack of communication between the two groups." Yes. *MRJ* Editor Phyllis Miller and I frequently face a similar dilemma when we have to decide whether a significant and otherwise excellent research report is too full of technical jargon to be intelligible to our readers. No doubt we sometimes commit errors of both inclusion and exclusion, but we do our best to interest and inform you. Please let us know your thoughts. Write to *Mensa Research Journal*, 1229 Corporate Drive West, Arlington, TX 76006, USA.

- I beg your indulgence for a whimsical diversion. One of my hobby-like interests is in SETI (Search for Extraterrestrial Intelligence). Among the many organizations I belong to is the SETI League, a worldwide group of amateur radio astronomers. They supplement the professionals such as those at the Nuffield Radio Astronomy Labs at Jodrell Bank, the SETI Institute in Sunnyvale, Calif., etc. They all have the problem of deciding how to discriminate an "intelligent" signal or beacon from the myriad kinds and sources of electromagnetic radiation the universe produces naturally. Earth's radio and TV emanations have now reached out over 60 light-years. If there are aliens listening on planets orbiting any of the 10,000 stars within that radius, will they decide it's intelligent? It would depend on their definition, wouldn't it? It is having clear definitions that allow us to discriminate between concepts, even those as subtly different as *aptitude* and *versatility*.

- Sometimes it's difficult to decide whether or not to review a book whose title looks relevant to *MRJ* readers but which turns out to be only marginally useful. Should we caution our readers about it, or simply be silent about it? That was the case when we received a review copy of Barbara A. Kerr's *Smart Girls (revised edition)*, published in 1994 by Gifted Psychology Press, Scottsdale, Ariz. We asked a Mensan psychotherapist, Dorothy D. Miller, MSW, ACSW, CCSW, to review it. Here's what she had to say:

> The author's laudable intent is to provide for highly intelligent women recognition of the obstacles they face and encouragement to reach their maximum potential.
>
> *Smart Girls (revised edition): A New Psychology of Girls, Women and Giftedness* offers the usual research protocol in providing statistics and describing research. A section of biographies of well-known, highly accomplished women, many of former times, written in a highly generalized style, occupies the second major portion of the book. Ms. Menchu, one of the women included, and still alive, has been discredited since this book went into print. The biographies have slight relevance to the rest of the book and seem to have been added as a way to make the book longer.
>
> The book is divided into many small sections with large bold headings, much like some of the pop psych books flooding the bookstalls these days. This, plus a word reversal and an incomplete sentence in the first few pages, detracts from the seriousness of the author's intent. It appears, by its format, to be written for pop psych readers, yet the full title suggests that its content would appeal to a more intellectual group of women, or group of educators who work with bright women. The readers who would be interested in this topic do not need this approach.
>
> Dr. Kerr laments the brain drain of bright women who choose homemaking and childrearing over a career. Those readers who were raised by maids while their mothers worked will readily recognize the flaw in that thinking. Children, especially the gifted, need the most intelligent caregivers that can be provided.
>
> The book does not address the issue of values and vocation. Bright women can teach their children and be role models for bettering the world by producing children who are formed to make a difference. The bright woman who stays home to do this is making a difference not readily measurable by statistics.
>
> Dr. Kerr minimizes the fact that women can choose to go back to the university and acquire advanced degrees at any time in life. Many, having raised families, develop a second vocation. While it is true that they may never quite catch up with the childless career woman, and will hit the ground running in their late forties or early fifties, they can still make a contribution that is very satisfying.

The second half of *Smart Girls* offers a description of varieties of giftedness sorted by age, stage and ethnicity. Here it does provide a rich assortment of suggestions for helping women reach their potential at every stage in education.

One cogent comment is that some gifted women feel unattracted to the fads and fancies of their peers. They do not try to fit in. Instead, they stand back, observe, and then follow their own dreams and values. If that could be regularly encouraged in school, church and home, it would help many bright women avoid the pitfalls of peer pressure. Learning to stand alone and strong, no matter what the crowd does, is an attribute that is achievable, even in adolescence.

- Although the mass media have now given it up as last year's news, the professional controversy about the book *The Bell Curve* continues. For example, there is *The Rising Curve: Long-Term Gains in IQ and Related Measures*, edited by Ulric Neisser and published in 1998 by the American Psychological Association at $39.95. The advertisement says it tells "a very different story." IQ scores "are going up everywhere in the world. What's more, the Black-White gap in the school achievement of American children has closed substantially in recent years." I haven't read it, but you might want to. Tell your librarian or bookstore that it's ISBN 1-55798-503-0.

- Another 1998 book that will interest those few of you who are sufficiently interested in cognitive assessment to pay $50.95 for it is *The Intelligence Test Desk Reference (ITRD): Gf-Gc Cross Battery Assessment*, published by Longwood Division, Allyn & Bacon (ISBN: 0-205-19857-0). The ad says it "provides a plan for evaluating the abilities measured by all intelligence batteries."

- Hans J. Eysenck, a brilliant and very controversial psychologist, died in 1997, but not before completing his book, *Intelligence: A New Look*. It was published in 1998 by Transaction Publishers (at Rutgers—The State University, in New Jersey). Even when I didn't agree with him, I've admired this man's imaginative and meticulous work. At $29.95, I might even buy the book. Or perhaps one of you would be willing to get a copy and review it for a future issue of *MRJ*?

- Dyslexia, a learning disability that affects a substantial number of gifted children and often hides their high intellectual potential from standard methods of identifying gifted students, is the subject of a 29-minute video distributed by Fanlight Productions, 47 Halifax Street, Boston, MA 02130. Titled simply *Dyslexia*, it won the Award for Excellence of the American Medical Writers Association. You can buy it for $149 or rent it for one-day showing for $50.

- In *Psychological Science Agenda*, March/April 1999, Monica Fabiani and Gabriele Gratton, University of Missouri, presented a brief report of EROS, which is not at all what you might think at first glance. EROS stands for Event-Related Optical Signal, a new laser light method of determining locations of brain activity in the cortex. During brain activity, the tissues change in their ability to scatter or absorb the light. The technique uses helmet-mounted lasers in the near-infra-red frequencies that, unlike other light frequencies, can penetrate 3 to 5 centimeters into living tissue. The intensity of the laser is very low — less than normal sunlight — and is therefore non-invasive. Extreme localization is possible. Activities separated by only about 1 centimeter can be distinguished.

The acronym EROS reminds me that the brain is said to be the major sex organ, so maybe some new research could be done on the precise location of.... Naaaa.

Francis Cartier
Associate Editor

Gifted Children with Learning Disabilities: A Review of the Issues

Linda E. Brody and Carol J. Mills, Center for Talented Youth, Johns Hopkins University

Abstract

Many people have difficulty comprehending that a child can be gifted and also have learning disabilities. As a result, children with special needs that result from both their high abilities and their learning problems are rarely identified and are often poorly served. This article explores the current policies and practices with regard to defining, identifying, and educating this population. Recommendations are included that would help ensure that students who are gifted and have learning disabilities receive the intervention needed to help them achieve their full potential.

When educators first began describing children who showed evidence of having a learning disability (LD) yet also appeared to be gifted, many viewed this as contradictory. This stereotype that had prevailed since Terman's (1925) time was that gifted children score uniformly high on intelligence tests and perform well in school. How could a child be considered gifted who has serious enough learning problems to be characterized as having a learning disability?

In 1981, a colloquium held at The Johns Hopkins University convened experts from the fields of both learning disabilities and giftedness to consider this issue. At the time, interest in meeting the needs of gifted and talented students, as well as students with learning disabilities, was evident on many levels, but students who exhibited the characteristics of both exceptionalities had received scant notice. The participants agreed that students who are gifted and also have learning disabilities do, in fact, exist but are often overlooked when students are assessed for either giftedness or learning disabilities. The colloquium did much to establish students who are gifted but also have learning disabilities as a population with special characteristics and needs (Fox, Brody, & Tobin, 1983).

In recent years, the concept of giftedness and learning disabilities occurring concomitantly in the same individual has become commonly accepted. Several books have been written on the subject, numerous articles have appeared in journals, and most educational conferences focusing on either learning disabilities or giftedness include at least one presentation on the dual exceptionality.

Reprinted from *Journal of Learning Disabilities,* vol. 30, no. 3, May-June 1997.

We appear to have reached an understanding that high ability and learning problems can both be present in the same individual. Nonetheless, empirical research on the characteristics and needs of this population has been limited, and relatively few students with LD who are gifted are identified as such or given special services. In this review, we examine some of the theoretical arguments, regulations, and educational practices that affect students with LD who are gifted.

Who are these students?

Students who are gifted and also have learning disabilities are those who possess an outstanding gift or talent and are capable of high performance, but who also have a learning disability that makes some aspect of academic achievement difficult. Some of these students are identified and their needs are met. This happens only rarely, however, unless a school specifically decides to identify and then serve these students. The majority of students who are gifted with learning disabilities "fall through the cracks" in the system.

There are at least three subgroups of children whose dual exceptionality remains unrecognized (Baum, 1994; Baum, Owen, & Dixon, 1991; Fox, Brody, & Tobin, 1983; Landrum, 1989; Starnes, Ginevan, Stokes, & Barton, 1988). The first group includes students who have been identified as gifted yet exhibit difficulties in school. These students are often considered underachievers, and their underachievement may be attributed to poor self-concept, lack of motivation, or even some less flattering characteristics, such as laziness (Silverman, 1989; Waldron, Saphire, & Rosenblum, 1987; Whitmore, 1980). Their learning disabilities usually remain unrecognized for most of their educational lives. As school becomes more challenging, their academic difficulties may increase to the point where they are falling sufficiently behind peers that someone finally suspects a disability.

A second group includes students whose learning disabilities are severe enough that they have been identified as having learning disabilities but whose exceptional abilities have never been recognized or addressed. It has been suggested that this may be a larger group of students than many people realize. In one study, as many as 33 percent of students identified with learning disabilities had superior intellectual ability (Baum, 1985). Inadequate assessments and/or depressed IQ scores often lead to an underestimation of these students' intellectual abilities. If their potential remains unrecognized, it never becomes a cause for concern or the focus of their instructional program. Due to this underestimation or to inflexible identification and/or instructional expectations in the "gifted program," they are rarely referred for gifted services.

Perhaps the largest group of unserved students are those whose abilities and disabilities mask each other; these children sit in general classrooms, ineligible for services provided for students who are gifted or have learning disabilities, and are considered to have average abilities. Because these students typically function at grade level, they are not seen as having problems or special needs, nor are they a priority for schools on tight budgets. Although these students appear to be functioning reasonably well, they are, unfortunately, performing well below their potential. As course work becomes more demanding in later years, and without the help they need to accommodate their limitations, their academic difficulties usually increase to the point where a learning disability may be suspected, but rarely is their true potential recognized.

For all three of these subgroups, the social and emotional consequences of having exceptional abilities and learning disabilities, when one or both of the conditions is unrecognized, can be pervasive and quite debilitating, as well as difficult to address if appropriate diagnosis and programming never take place or are delayed until adolescence (Baum et al., 1991; Durden & Tangherlini, 1993; Fox, Brody, & Tobin, 1983; Whitmore, 1980). With an increasing number of LD researchers questioning the relevance of a child's aptitude in determining intervention strategies (cf. Siegel, 1989), even fewer students with high potential and learning disabilities will be recognized or fully served, resulting in a great waste of intellectual potential.

Definitions

The literature is replete with references to individuals with extremely high abilities and talents who also have a specific learning disability (e.g., Aaron, Phillips, & Larsen, 1988; Goertzel & Goertzel, 1962; Ochse, 1990; Thompson, 1971). Some researchers have even suggested that, at least for some individuals, the learning disability may be fundamentally associated with a "gift" (e.g., Geschwind, 1982; West, 1991). To most practitioners who work with individuals with disabilities, being gifted and also having learning disabilities does not appear to be an unfamiliar or especially problematic condition, at least in theory. Nonetheless, a number of thorny issues and debates make the understanding and identification of the condition difficult.

Controversy surrounds what is meant by the terms gifted and learning disabled. As Vaughn (1989) pointed out, "no two populations have suffered from more definitional problems than learning disabled and gifted" (p. 123). With regard to students who exhibit the dual exceptionalities simultaneously, legislation defining special populations has never specifically described this group. When educators and researchers describe these students as a unique group, they generally talk about students who exhibit strengths in one area and weaknesses in another (e.g., Ellston, 1993; Fall & Nolan, 1993) and /or show a discrepancy between potential and performance (e.g., Gunderson, Maesch, & Rees, 1987). For a more formal definition, however, it has been necessary to rely on the separate prevailing definitions of gifted children and children with learning disabilities, which are almost always inadequate for accommodating students who exhibit the characteristics of both groups simultaneously.

Definitions of Learning Disabilities

Numerous conceptual definitions of learning disabilities have been proposed by experts in the field (Hammill, 1990). Most of these allow for the co-occurrence of being gifted and having learning disabilities, as they set no upper limit on general intelligence or specific abilities in one or more areas. When the Association for Children and Adults with Learning Disabilities (1985) proposed a definition that specifically included the phrase "average and superior intelligence" occurring concomitantly with the disability, the door was opened wider for recognition of children with disabilities who are gifted. Some conceptual definitions include a reference to a discrepancy between intellectual ability and achievement, a concept and practice that is important for identifying many students with LD who are gifted, though the use of such a discrepancy for defining a learning disability has been criticized (cf. Lyon, 1989). Although there is nothing in most LD definitions that excludes students with learning disabilities who are also gifted, the definitions fail to specifically encourage practitioners to identify students in this subgroup.

Swanson's (1991) review of operational definitions is quite useful in understanding the issues related to defining and identifying learning disabilities. Many of the issues and debates he discusses, particularly the concepts of specificity (which refers to a learning disability being confined to a limited number of academic or cognitive domains), discrepancy (whereby it is determined that a child's achievement does not measure up to his or her potential), and exclusion (whereby the learning disability is distinguished from other handicapping conditions), are particularly relevant to defining students with academic talents and learning disabilities. Because operational definitions are so closely tied to identification, these issues and debates are reviewed later in this article under "Identification."

Definitions of Giftedness

In the gifted and talented field, attempts to define giftedness from a conceptual viewpoint have resulted in little consensus. For example, giftedness has been defined as high general intelligence (Terman, 1925); high aptitude in a specific academic area (Stanley, 1976); and the interactions among high ability, task commitment, and creativity (Renzulli, 1986). (For other examples, see Sternberg and Davidson, 1986.) Perhaps contributing to the difficulty in defining giftedness is the lack of agreement as to what intelligence is, with proponents of a variety of psychometric, developmental, and information-processing approaches offering conflicting viewpoints (Kail & Pellegrino, 1985; Sternberg & Detterman, 1986). Some of these definitions are more likely than others to accommodate the child with learning problems. For example, Gardner's (1983) concept of multiple intelligences provides for showing high ability in one area without requisite corresponding ability in all areas. In contrast, proponents of the concept of general "g" (Spearman, 1927) have greater difficulty considering students with learning difficulties as highly able.

A multifaceted view of giftedness, proposed by Marland (1972), has been adopted by the U.S. Department of Education and a majority of state departments of education and school systems. Marland described gifted and talented children as those who demonstrate high achievement or potential in any one or six areas: general intellectual ability, specific academic aptitude, creative or productive thinking, leadership ability, visual and performing arts and psychomotor ability (which was deleted in subsequent legislation). Recently, a revised definition has asserted that "outstanding talents are present in children and youth from all cultural groups, across all economic strata, and in all areas of human endeavor" (U.S. Department of Education, 1993, p. 26). This recognition of culturally disadvantaged gifted children was not matched by equal attention to gifted students with learning disabilities. However, neither federal definition of the gifted child excludes students with learning disabilities because the definitions (a) specify that a child need not be exceptional at everything to be gifted, (b) set no lower limits of performance or ability in remaining areas, and (c) specifically acknowledge that students can be gifted even if they are not currently performing at a high level, as long as they have the potential. Unfortunately, however, academic potential independent of performance is a difficult concept for many to accept.

Conclusion

Attempts to describe students with LD who are gifted have drawn heavily on definitions of each exceptionality separately; yet, a lack of consensus is evident in definitions of giftedness or learning disabilities, and the implications of the two conditions overlapping have not been adequately considered. For example, the broad-based federal definitions of giftedness, as well as other definitions, recognize students' abilities in a variety of areas. Thus, a student might exhibit talent in leadership or the arts but not in academic areas, and be labeled gifted and qualify for services. If such a student also has a learning disability, he or she might be considered gifted and learning disabled. The concept that a student might have different abilities and needs in art than in mathematics is not difficult for most people to accept or understand.

However, accepting the concept that a student's giftedness and learning disabilities both lie in related academic areas, such as a student whose reading level is well above grade level but who has great difficulty with spelling and writing, is more problematic for most people. And the programming implications for these two types of students (i.e., those whose talents and disabilities lie in related or unrelated areas) are very different. Although students whose strengths and weaknesses are in unrelated areas might be gifted and have a learning disability, it is students whose talents and disabilities overlap and are both in academic areas who are most likely to be misunderstood, underserved, and in need of special services.

Descriptions of individuals who are academically talented and individuals who have learning disabilities should be examined and expanded to include students who exhibit the characteristics of both exceptionalities simultaneously in related and unrelated areas. At present, the operational definitions currently used by most schools to place children in gifted or special education programs exclude many academically talented students with learning problems who rarely meet the rigid cutoffs of most identification procedures (Fall & Nolan, 1993). For the few students who are identified via existing definitions and guidelines, it usually means receiving services in one area or the other, but not both.

Identification

At present, identifying students for gifted programs and for special education services for individuals with learning disabilities tend to be mutually exclusive activities (Boodoo, Bradley, Frontera, Pitts & Wright, 1989). Unfortunately, too many students with LD who are gifted fail to meet the eligibility requirements for either because the identification protocols fail to consider the special characteristics of this population. For example, research has shown that teachers are much more likely to refer nondisabled students than students with learning disabilities for placement in gifted programs (Minner, 1990; Minner, Prater, Bloodworth, & Walker, 1987). Screening for learning disabilities typically requires evidence of underachievement. Gifted students who are able to compensate for their learning problems rarely get referred unless they exhibit behavioral problems (Senf, 1983). At the same time, because students with LD who are gifted rarely show consistently high achievement, they often go unrecognized as being gifted. Although a few will qualify for special education services because of the severity of their disability, and some will qualify for gifted services because of the type or level of their talent (Baum et al., 1991), most students with LD who are gifted rarely qualify for multiple services. Unless operational definitions and identification criteria are modified to accommodate the characteristics of this subgroup, this situation will, unfortunately, continue.

In an effort to shed light on the pattern of abilities of students with LD who are gifted, and to simplify identification, many researchers in this area have focused on Wechsler Intelligence Scale for Children-Revised (WISC-R) score patterns (e.g., Bannatyne, 1974; Baum et al., 1991; Kaufman, 1979). To date, however, no consistent pattern of results has come from this research. Although Schiff, Kaufman, and Kaufman (1981) reported a significant Verbal-Performance (V-P) discrepancy (greater than that found for students with LD with average ability), with Verbal scores higher, Waldron and Saphire (1990) concluded that a significant discrepancy between Verbal and Performance scores may not be the best indicator of a learning disability in gifted students. Barton and Starnes (1989) observed that "the inconsistencies in magnitude or direction of V-P discrepancies among the studies seem to result from differing patterns of deficits in the samples" (p. 28), and Fox, Brody, and Tobin (1983) concluded that "more research is needed to determine what, if any, unique patterns characterize the gifted/LD child" (p.106).

It is clear that we are dealing with a very heterogeneous group of students who represent all types of intellectual giftedness and academic talents, in combination with various forms of learning disabilities. Therefore, trying to find one defining pattern or set of scores to identify all gifted students with learning disabilities is probably futile. On the other hand, there are some defining characteristics that should be considered in identifying these students: (a) evidence of an outstanding talent or ability, (b) evidence of a discrepancy between expected and actual achievement, and (c) evidence of a processing deficit.

Evidence of an Outstanding Talent or Ability

To identify a student with LD who might be gifted, one should find evidence of a special gift, talent, or ability whereby the student exhibits performance at a high level or the ability to perform at a high level. The talent or gift can be general ability or a specific talent in any of a variety of areas. However, practitioners need to recognize that a learning disability can depress the test performance of students who are academically talented. Thus, if academically talented students with learning disabilities are to be recognized as gifted, cutoff scores on whatever measures are used may have to be adjusted downward to accommodate the depressing effect of their learning disability (Karnes & Johnson, 1991; Silverman, 1989), and, for those students who manage to meet cutoff scores in spite of their disability, the extraordinary nature of their ability should be recognized.

When seeking evidence of a student's ability or potential, one often turns to a standardized intelligence test. However, the use of IQ tests for identification is problematic and has become increasingly controversial. The issues have to do with the nature of IQ tests and what they measure, the appropriateness of using them for certain populations, and whether an IQ score contributes to our understanding of students or programming decisions for them.

Within the field of gifted education, the reliance on IQ scores to identify gifted students has been questioned on many fronts. One concern is that intelligence tests measure a limited range of abilities (Ramos-Ford & Gardner, 1991; Sternberg, 1991) and thus many gifted students will be overlooked. For example, intelligence tests are not good measures for identifying students who are creatively gifted (Torrance, 1979) or mathematically gifted (Stanley, 1974, 1979). The IQ scores of students from disadvantaged backgrounds may not reflect their true abilities (Baldwin, 1991). And, with gifted students who have learning disabilities, global IQ measures may be particularly insensitive to depression of scores caused by the disability (Fox & Brody, 1983).

Another concern is that a global measure of ability is not particularly helpful for educational programming (Fox & Brody, 1983). Although some children can certainly be gifted and talented in many diverse areas, identifying students who have exceptional talent in a specific area (e.g., mathematics, written expression) lends itself to targeted instruction and programming that is more appropriate and, ultimately, more justifiable (Durden & Tangherlini, 1993; Stanley, 1974). With just a global measure of academic potential to work with, only a global and often academically irrelevant program can be implemented. This is not to say, however, that IQ tests have no usefulness for diagnostic or intervention purposes.

Fox and Brody (1983) discussed the appropriateness of intelligence tests, aptitude and achievement tests, teacher nominations, and creativity tests for identifying strengths and potential in students with LD who are gifted. Torrance (1982) used the Torrance Tests of Creative Thinking to identify creatively gifted students, some of whom had LD. Behavioral observations and structured interviews have also been recommended for identifying gifted students with learning disabilities (Baum et al., 1991). In general it seems advisable to use a variety of assessments, including intelligence tests, to measure potential and assess strengths in children who might be learning disabled and gifted.

In practice it is rare that giftedness is identified only through IQ scores. The federal definitions of giftedness require assessment of ability, aptitude, and achievement in a variety of talent areas. Talent searches conducted by Johns Hopkins, Duke, and Northwestern universities, the University of Denver, and others employ Stanley's (1974, 1977) model of using above grade-level aptitude tests to assess exceptional reasoning ability in mathematical and/or verbal areas (Cohn, 1991). The gifted field appears to be moving in the direction of identifying specific subgroups of students who can be more specifically served. Unfortunately, identification of such discrete subgroups also may result in students being overlooked whose exceptional abilities and learning disabilities are in closely related areas.

Within the LD community, there is also debate as to whether IQ tests are the best or most appropriate measure of potential. At a more problematic level, however, is the question of whether it is necessary or even useful to recognize a child's potential. As part of that debate, it has been pointed out that two children with very different IQ scores, both exhibiting problems in learning to read, may not be fundamentally different in terms of decoding (or phonological-processing) skills (cf. Siegel, 1989; Stanovich, 1986). As Lyon (1989) noted, however, they are "qualitatively and quantitatively different from each other on tasks assessing a range of 'intelligent' behaviors" (p. 505) that may be critical to how they learn and adapt. Furthermore, a child's level of intelligence may influence his or her emotional and behavioral responses to persistent failure, parent and

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teacher expectations, and, most importantly, remediation (Lyon, 1989). For example, Olson (1985) found that verbally intelligent readers with a learning disability were able to depend less on labored phonetic coding and more on context and orthographic codes when reading continuous text. Similarly, French (1982) found that a gifted nonreader was able to use contextual cues to learn to read. These arguments for recognizing a child's potential are extremely relevant for students with LD who are academically talented.

The critical issue, of course, for gifted students with learning disabilities is that without some measure of high ability (whether that measure is an IQ score or something else), and then recognition of a discrepancy between that ability and achievement, few will be identified. Although the debate is largely theoretical at present because IQ is still commonly used in practice when assessing learning disabilities, the decision to ignore intellectual potential would have major consequences for students with learning disabilities who are also gifted.

Evidence of an Aptitude-Achievement Discrepancy

Gifted students who have learning disabilities in a related area should show evidence of a discrepancy between their high ability and their achievement. Students whose talents and disabilities are in unrelated areas may be considered gifted and also be diagnosed with learning disabilities, but the performance discrepancy concept (a discrepancy between expected and actual achievement) does not apply.

Although the concept of a performance discrepancy is common in many operational definitions of learning disabilities, numerous objections to the use of an IQ-achievement discrepancy to identify students with learning disabilities have been raised (cf. Lyon, 1989; Stanovich, 1993). Even though arguments against defining learning disabilities on the basis of a performance discrepancy have much validity, seeking evidence of a discrepancy between ability and achievement is particularly important for identifying students who are academically talented and learning disabled. This is because the relatively high achievement of many of these students (compared to that of their chronological-age peers) often masks a disability unless that achievement is compared to the student's ability. Proposals to select students for intervention solely on the basis of poor achievement-for example, performance in the bottom 20% or so on an achievement test (Reynolds, Zetlin, & Wang, 1993; Siegel & Metsala, 1992)-will not identify gifted students with learning disabilities who function at or near grade level. Although a discrepancy between ability and achievement should not be the only feature for describing gifted students with learning disabilities, it should be a piece of information that is carefully considered. In general, Graham, and Harris's assertion (1989) that "decisions as to presence and severity of learning disabilities must ultimately rely on professional judgment....based on a multifaceted assessment of which norm-referenced IQ and achievement data are only a part" (p. 502) seems appropriate for gifted students with learning disabilities as well.

Evidence of a Processing Deficit

Although the presence of an aptitude-achievement discrepancy may be a prerequisite for identifying academically talented students with learning disabilities, it is not sufficient in and of itself, as such a discrepancy may result from very different causes (Krippner, 1968; Silverman, 1989; Whitmore, 1980). Likewise, uneven profiles or discrepancies among test scores do not, in themselves, necessarily constitute evidence of a learning disability (Patchett & Stansfield, 1992). Evidence of a processing deficit, however, can help distinguish a learning disability from other causes of underachievement.

For example, the identification of processing deficit (obtained by examining subtest scores from an IQ test, such as the WISC-R and/or specific processing tests) can help in differentiating between naturally occurring differences in the development of specific cognitive abilities (e.g., widely different levels of verbal ability vs. quantitative ability) and the co-occurrence of intellectual giftedness and a learning disability. Identification of a processing deficit can also help in differentiating between a gifted child who is underachieving because of educational placement issues (e.g., a curriculum that is not sufficiently challenging) and one who is not achieving at a level commensurate with his or her general ability because of a learning disability (Rimm, 1986; Whitmore & Maker, 1985).

The idea that a learning disability can and should be distinguished from other known causes of learning problems (e.g., low intellectual ability, lack of opportunity to learn, poor teaching, emotional problems) has been challenged in the LD literature by those who suggest that students with learning disabilities and students with learning problems due to other causes have more similarities than differences (e.g., Kavale, 1980; Stanovich, 1993; Taylor, Satz, & Friel, 1979). On the other hand, Adelman (1992) suggested that

> failure to differentiate underachievement caused by neurological dysfunctioning from that caused by other factors has been cited specifically as a major deterrent to important lines of research and theory and is certainly a threat to the very integrity of the LD field (p.17).

Identifying the cause of a learning problem is particularly important for gifted students with learning disabilities. Without it, diagnoses separating gifted students who exhibit learning difficulties into subgroups of those with learning disabilities, those with normal variation in cognitive development, and those who are unmotivated for a variety of reasons can be problematic. Differential diagnosis is, of course, important for decisions regarding the need for intervention, as well as the appropriate type of intervention (Daniels, 1983). It is important, however, to note that in children with high abilities, scores on any test (including processing tests) that are "average" may be sufficient to indicate a "deficit."

Conclusion

The lack of a clear description of gifted students with learning disabilities has resulted in few of these students being identified. The following points seem to be evident: (a) There is a rationale for thinking about these students as a separate subgroup; (b) students with LD who are gifted represent a heterogeneous group with many different types of gifts/talents and disabilities; (c) a performance discrepancy is essential for identifying gifted students with learning disabilities; and (d) for appropriate intervention to take place, it is necessary to establish causal factors for the learning problems, or at least to rule out other causal factors that could lead to very different interventions. A complete assessment battery is needed to identify and plan interventions for gifted students with learning disabilities, including an individual intelligence test, an achievement battery, indicators of cognitive processing, and behavioral observations.

Ideally, early identification and appropriate intervention are recommended to help prevent the development of the accompanying social and behavioral problems that often result when the needs of a gifted child with learning disabilities are overlooked (Whitmore, 1980). In addition, the identification of talents and learning problems should continue as an ongoing process throughout the school years. Children's abilities and needs, as well as available services, change over time so that continuous reevaluation is necessary. In particular, one should beware of rigid cutoff scores for program participation that discriminate against students with the atypical profiles that characterize gifted children with learning disabilities.

Intervention

The lack of a clear definition that recognizes the unique characteristics and needs of gifted students with learning disabilities and of a protocol for identification has resulted in few specific programs being developed in school systems for this population. For example, a survey in one state found that the majority of school systems reported having no gifted children with learning disabilities in their district and no special programming (Boodoo et al., 1989). It has also been noted that some state policies impede the development of services for gifted children with learning disabilities because they do not permit school districts to be reimbursed twice for the same student, inadvertently implying that one cannot simultaneously have two exceptionalities (Baum, 1994).

Although the need for studies on effective treatments for gifted students with learning disabilities was cited in a 1987 report to Congress (Interagency Committee on Learning Disabilities, 1987), program development and evaluation with regard to this population has been weak (Vaughn, 1989). Recent promising developments, however, include a commitment by the Maryland Task Force on Gifted and Talented Education (1994) to meeting the needs of gifted students with learning disabilities, and the funding of several projects to develop programs for this population under the Jacob K. Javits Gifted and Talented Education Act (U.S. Department of Education, 1994). It remains to be seen whether these efforts will lead to additional program development on behalf of gifted students with learning disabilities.

Individualized Education Programs

Although many gifted students with learning disabilities would be best served by separate programs developed especially for them, it is likely that the needs of many could be met through appropriate identification of strengths and weaknesses and a flexible, individualized approach to using the existing services and resources available in and out of school. Gifted students with learning disabilities need (a) high-level or "gifted" programming in their areas of strength, (b) developmental instruction in subjects of average growth, (c) remedial teaching in areas of disability, and (d) adaptive instruction in areas of disability (Fox, Brody, & Tobin, 1983; Virginia Department of Education, 1990). Programs and/or services for average-achieving students who primarily need age-appropriate instruction, for gifted students who need accelerated and/or enriched instruction, and for average ability students with disabilities could be utilized to develop an optimal Individualized Education Program to meet the needs of gifted students with learning disabilities.

Ideally, the individualized program would be developed through a team effort involving the parents, a gifted specialist, a learning disabilities specialist, a diagnostician, the general classroom teacher, and the child himself or herself (Silverman, 1989; Van Tassel-Baska, 1991). In developing the student's unique educational program, his or her particular strengths and weaknesses, as well as the resources available in the school, should be considered. The specifications should depend, of course, on the nature and severity of the student's disability as well as his or her degree of giftedness; however, there is much consensus that it is important to focus primarily on the student's strengths rather than his or her weaknesses. Generally, remediation is not the primary need of these students; instead, attention should be placed on developing the gift or talent (Baum et al., 1991; Ellston, 1993; Griffin, 1990). Learning strategies and adaptations can help ensure these students' success in whatever that is in a special class for gifted students with learning disabilities or another environment.

Special Classes for Gifted Students with Learning Disabilities

Numerous educators who have studied gifted children with learning disabilities have found that, ideally, these students should receive instruction as a special group for at least part of the day from a teacher sensitive to their specific academic, social, and psychological needs and with peers who share their dual exceptionalities (Daniels, 1983; Whitmore & Maker, 1985; Yewchuk, 1985). To date, however, few teachers have received specific training in the characteristics of gifted students with learning disabilities, and few separate programs for these students exist. Some schools have developed special classes for this population, and the Javits grants have stimulated a few additional programmatic initiatives. In some cases the students stay together all day; in others, a resource room model is used whereby gifted students with learning disabilities are bought to the resource room with other students who share their dual exceptionalities.

The separate-class/all-day model for students with LD who are gifted is often recommended for students with the most serious disabilities. For example, one school system identified gifted students with varying degrees of learning disabilities and developed a special self-contained class for gifted students with severe learning disabilities; those with moderate and mild disabilities received other services (Starnes et al., 1988). Regardless of the severity of the students' problems, self contained classes offer numerous advantages for differentiated learning (Clements, Lundell, & Hishinuma, 1994); eliminate the movement from classroom to classroom required when services are provided in a combination of gifted, special education, and general classrooms (Suter & Wolf, 1987); and may be better suited to meet students' emotional needs (Suter & Wolf, 1987). Such programs typically try to address issues related to raising self-esteem and influencing motivation, as well as individualizing instruction to enhance academic achievement.

An example of a full-time program for gifted students with learning disabilities can be found at ASSETS, a school in Hawaii for students who are "gifted/at risk, dyslexic/learning disabled, and gifted/dyslexic" (Clements et al., 1994). The school utilizes an interdisciplinary approach to instruction in self-contained classes, includes acceleration and enrichment to challenge strengths while also building basic skills, and attends to the students' social and emotional needs as well. For other program models and/ or programmatic ideas for separate programs for gifted students with learning disabilities, see Baldwin and Gargiulo (1983), Baum et al. (1991), Udall and Maker (1983), and Whitmore (1980).

A part-time resource room model for academically talented students with learning disabilities is another option for exposing such students to peers who share their dual exceptionalities. The literature describing these efforts reports several attempts to modify traditional enrichment programs for this population. For example, the Schoolwide Enrichment Model (Renzulli & Reis, 1985), a program that encourages academically talented students to take on in-depth project on topics of their choice, was used in a class in which the students had all been identified as gifted with learning disabilities. The teacher was a specialist in both gifted and special education, and specific strategies were used with this group to augment their disabilities and compensate for weaknesses (Baum, 1988). Another gifted program model, Bett's (1985) Autonomous Learner

Model, which offers enrichment in an atmosphere that supports self-advocacy, has also been adapted for gifted students with learning disabilities (Fall & Nolan, 1933; Nielsen, Higgins, Wikinson, & Webb, 1994).

Whether full time or part time, special classes for gifted students with learning disabilities allow the teacher to develop a program unique to this population, one that is challenging but also provides structure and strategies to accommodate weaknesses. Students gain support from being with other students who also exhibit seemingly contradictory strengths and weaknesses. In the other settings, students must adapt more to the setting; learning to adapt and compete with nonhandicapped students is also important.

Using and/or Adapting Existing Services

For students with LD who attend schools that do not offer special programs for gifted students with learning disabilities, or for whom the special program does not fully meet their needs, consideration should be given to designing an individualized program from the programmatic options and special services already available in the school, supplemented by appropriate adaptations that will help ensure success in the various settings.

Instruction in the General Education Classroom. As schools move toward inclusion of all students in general classrooms as a result of the Regular Education Initiative (Will, 1986) and show reluctance toward grouping students on the basis of aptitude or achievement (Oakes, 1985; Slavin, 1987), the general education classroom is becoming a place where teachers are expected to meet the needs of a wide range of students. If this arrangement can successfully challenge all students, including gifted students, average students, and students who also have learning problems, gifted students who also have learning disabilities could be well served.

Whether or not such a diverse group can be optimally served in one environment is still not clear, however (Fuchs & Fuchs, 1994), as the movement toward full inclusion is not backed by supportive research (Mather & Roberts, 1994). Problems involved in addressing the needs of students with severe disabilities in a general classroom have been raised by teachers and others in the field (Kauffman, 1995; Vaughn, Schumm, Jallad, Slusher, & Saumell, 1996). Students who function at or near grade level, even if they are academically talented and have learning disabilities, are even more likely to be overlooked in an environment that includes students with more severe underachievement and students with more obvious high ability. Historically, learning disabilities have been considered an "invisible disorder"; the problems and needs of gifted students with learning disabilities may be the most invisible of all.

There is also much concern within the gifted community about the impact of the movement on the policy of grouping students by ability (e.g., Feldhusen & Moon, 1992; Gallgher, 1991; Mills & Durden, 1992; Robinson, 1990; Rogne, 1993). When aptitude and achievement are considered before placing students in a general classroom, large- and/or small-group instruction can be designed to meet their particular needs. Although the academic benefits of ability grouping for gifted students have been well documented (e.g. Kulik & Kulik, 1990; Mills & Durden, 1992), the practice has become controversial and consequently less often implemented in today's schools.

If the general classroom teacher does not recognize and accommodate individual differences, the gifted child with learning disabilities whose total placement is that classroom cannot receive an appropriate education. On the other hand, if the general classroom teacher does accommodate individual differences, or if the general classroom placement is supplemented by time spent in special programs for the gifted and/or for students with learning disabilities, placement in the general classroom may be appropriate for gifted students with learning disabilities.

In schools that continue to offer separate services and programs for students identified as gifted and for students with learning disabilities, the general classroom serves primarily as the place where the curriculum is at or about grade level. For gifted students with learning disabilities, placement in the general classroom is appropriate for developmental instruction in subjects of normal achievement, although some compensatory strategies (such as using a calculator) might be necessary for optimal performance.

The general classroom teacher needs to be particularly aware that gifts and disabilities may mask each other and that students who are academically talented and have learning disabilities are likely to exhibit variable performance and social and emotional difficulties (Landrum, 1989). The general classroom teacher should also be the chief source of referral of gifted students with learning disabilities to special education services and gifted programs in their schools (Boodoo et al., 1989).

Programs and Services for Gifted Students. Programs for gifted students vary considerably in form and content. The many options include differentiated instruction in the general classroom through small-group or independent instruction, self-contained classes where high-ability students are grouped together to learn material at a faster rate and/or more advanced level, and part-time pull-out programs. The content may be accelerated or enriched. Placement with older students for one or more subjects is also an alternative. Regardless of the type of program, the purpose of differentiated instruction for gifted and talented students is to provide access to more challenging subject matter than is normally available in the regular curriculum. When gifted students are grouped together for instruction, the interaction with other talented students is viewed as advantageous for learning and peer support. Unfortunately, there is considerable evidence that we do not provide adequate programmatic options for gifted students in our country (Maryland Task Force on Gifted and Talented Education, 1994; U.S. Department of Education, 1994, p.6).

Nonetheless, a variety of programs and services is still available in the schools, and more may emerge from some of the new initiatives. However, the problems related to identifying gifted students with learning disabilities, and the reluctance shown by many teachers of the gifted to accommodate special needs, result in few students with these dual exceptionalities being included in programs for the gifted. Although the severity of the learning disability and the nature of the gifted programming should be considered in determining placement of gifted students with learning disabilities into classes for gifted children, every effort should be made to include them if possible.

Acceleration and enrichment are two approaches to meeting the needs of the gifted. Acceleration can include moving ahead of one's age peers in grade placement and/or subject matter (Southern & Jones, 1991). Subject matter acceleration may be particularly beneficial as a vehicle for gifted students with learning disabilities to receive advanced course work in their areas of strength without having to be placed at the same level in their areas of weakness. For example, mathematically talented students might progress rapidly at their own pace through an accelerated mathematics class (Benbow, 1986), even if learning disabilities pose some problems for them in creative writing or learning a foreign language. In addition, with moderate adaptations, such as encouraging the use of calculators, word processors, untimed tests, and so forth, it is likely that many gifted students with learning disabilities could succeed in rigorous and /or accelerated courses in their areas of strength. This fact has been recognized in recent years by selective colleges that realize the benefits of adapting to the needs of academically talented students with learning disabilities (e.g., see Brown University, 1990).

Enrichment programs are intended to provide gifted students with a more varied educational experience, either by modifying the curriculum to include depth and/or breadth or by offering exposure to topics not normally included in the curriculum. Numerous models have been developed; one that has been used specifically with gifted students with learning disabilities, as noted earlier, is the Schoolwide Enrichment Model (Renzulli & Reis, 1985). This and other pull-out enrichment programs have proven to be successful with this population, allowing gifted students with learning disabilities to interact with other talented students and to be challenged in an area of strength (Baum et al., 1991). The value of structuring the learning experiences of a gifted child with LD around his or her interests and experiences was cited by Daniels (1983), and this would be provided by many enrichment programs. Mentorships are another programmatic vehicle for gifted students that should be considered for those who also have learning disabilities; the mentors serve as role models while offering an opportunity for the students to learn about a subject of interest in a one-on-one environment (Baum et al., 1991).

Some concern has been raised about the possibility that gifted students with learning disabilities will become frustrated if they fail to compete with nonhandicapped peers in programs for the gifted (Tannenbaum & Baldwin, 1983), or that they will have trouble coping with the demands of having to work independently (Suter & Wolf, 1987). Such issues will have to be evaluated for students on an individual basis, but adaptive techniques, such as using calculators, word processors, untimed tests, and tape recorders, can help students compensate and succeed in challenging gifted programs (if basic reading, writing, or computation skills are deficient but thinking skills are at a high level; Fox, Tobin, & Schiffman, 1983). Teachers of the gifted, however, may be particularly guilty of being unwilling to adapt to the needs of a student who is not consistently a high achiever.

A study of gifted students with learning disabilities found that those receiving a combination of both gifted and learning disability services or only gifted programming reported higher self-concept than did those students receiving intense or exclusive learning disability services (Nielsen & Mortorff-Albert, 1989). Thus, there may be positive social and emotional effects, as well as academic ones, of making accelerated or enriched academic experiences available to gifted students with learning disabilities. Given the strong concern among educators that academically talented students with learning disabilities be challenged in their areas of strength, placement in a gifted program for at least part of the day seems advisable.

Resources for Students with Learning Disabilities. Special services for students with learning disabilities typically focus on helping to remediate weaknesses. This may occur in the general classroom or in a resource room for students with learning disabilities. Gifted students with learning disabilities may benefit from some time spent with a specialist who can offer remedial strategies. A special education resource room setting, however, is unlikely to be the best environment for providing intellectual stimulation for students with learning disabilities who are also gifted. The nature, severity, and cause of the gifted student's disabilities, as well as the student's age, must be considered when evaluating placement in an LD resource room, even for part of the day; this placement is more likely to be appropriate for students with more serious disabilities. It is crucial, however, not to overlook the importance of challenging the student's "gift" (Baum et al. 1991).

Teacher training can contribute to making teachers, whose primary responsibility is to remediate students' deficiencies, more aware of the needs of their students who are also gifted. A program in Connecticut successfully trained special education teachers to provide challenging enrichment to gifted children with learning disabilities (Baum, Emerick, Herman, & Dixon, 1989).

Teaching Strategies and Adaptive Techniques

Regardless of the program model utilized or the setting in which it is taught, the importance of gearing the curriculum to the strengths, rather than weaknesses, of academically talented students with learning disabilities, and of utilizing a variety of strategies, adaptations, and accommodations to help them succeed, is widely acknowledged (e.g., Baum et al., 1991; Fox, Tobin, & Schiffman, 1983; Hishinuma, 1991; Silverman, 1989; Suter & Wolf, 1987; Waldron, 1991). Carving big tasks into smaller units; making tasks meaningful; and using praising, peer tutoring, and cooperative activities are some of the techniques that can help ensure success (Baum et al., 1991). Role models of successful adults with disabilities can also help to enhance self-esteem and build aspirations among gifted students with learning disabilities (Silverman, 1989).

Accommodations, particularly the use of technology, are highly recommended to help these academically talented students overcome their disabilities (Baum et al., 1991; Daniels, 1983; Howard 1984; Suter & Wolf, 1987; Tobin & Schiffman, 1983; Torgesen, 1986). Such techniques may be helpful to many students with learning disabilities, but they are especially beneficial to those who are also gifted and in need of moving ahead in their areas of strength. For example, students who are capable of a high level of mathematical problem solving but who have difficulty with computation could be given a calculator so that they will not be held back in mathematics. A microcomputer with a word processing package and a spell checker can be enormously helpful to a student whose problems lie in writing and /or spelling. Students who have difficulty taking notes in class might be allowed to tape-record lectures. Tape-recorded books and other sources of information that are not dependent on reading (e.g., films) might also help students with reading problems. Alternative evaluation methods (such as untimed or oral tests) have also been advocated (Suter & Wolf, 1987), as has the use of multisensory techniques (Daniels, 1983).

Enthusiasm for learning can be enhanced by helping gifted students with learning disabilities take responsibility for their own learning, exposing them to new and interesting methods of inquiry, teaching them self-assessment techniques, providing experiential learning, exposing them to a broad range of topics to encourage new interests, and assisting them in locating information (Miller, 1991; Moller, 1984, p.168). One very promising approach for working with gifted students with learning disabilities is helping them to develop their metacognitive abilities and strategies (Montague, 1991).

Counseling

The drive to achieve perfection, common in many gifted children, generates much psychological conflict in academically talented children who have difficulty achieving (Olenchak, 1994). One survey of gifted students with learning disabilities found them to be emotionally upset and generally unhappy because of their frustrations; in particular, "virtually all had some idea that they could not make their brain, body, or both do what they wanted it to do" (Schiff et al., 1981, p. 403).

Gifted students with learning disabilities may also experience conflict between their desire for independence and the feelings of dependence that result from the learning disability, as well as between their high aspirations and the low expectations others may have for them (Whitmore & Maker, 1985). Low self-concept is a common problem among gifted students with learning disabilities who have difficulty coping with the discrepancies in their abilities (Fox, Brody, & Tobin, 1983; Hishinuma, 1993; Olenchak, 1994; Whitmore, 1980). Frustration, anger, and resentment can result, influencing behavior as well as relations with peers and family members (Mendaglio, 1993). In fact, parents of gifted students with learning disabilities are quick to emphasize the importance of addressing the social and emotional needs of their children (Hishinuma, 1993).

In planning interventions for students with LD who are gifted, one should not overlook the importance of providing counseling for these students to address their social and emotional needs (Brown-Mizuno, 1990; Hishinuma, 1993; Mendaglio, 1993; Olenchak, 1994; Suter & Wolf, 1987). The benefits of both group and individual counseling can let students see that others experience problems similar to their own. However, some students may require the attention to their unique problems and needs that is more likely to occur in one-on-one individual counseling. The counseling role can sometimes be undertaken by teachers who understand the needs of gifted students with learning disabilities (Baum et al., 1991; Daniels, 1983; Hishinuma, 1993). Parents also need counseling to help them understand the characteristics and needs of their gifted children with learning disabilities (Bricklin, 1983; Brown-Mizuno, 1990; Daniels, 1983).

In addition to addressing the social and emotional needs of gifted students with learning disabilities, counselors advise students on appropriate course-taking, particularly during the secondary school years, on opportunities to participate in extracurricular activities and other learning experiences outside of school, and on postsecondary options. As gifted students with learning disabilities approach the college years, they need help in identifying colleges that will accommodate their special needs.

Conclusion

Clearly, students with LD who are gifted have needs that differ considerably from those gifted students without disabilities, students without exceptional abilities who have learning disabilities, and average students whose abilities are more even. Individualized instruction is optimal for all students so that pace, level, and content can be geared to ability, interests, and learning style, but it is essential for students whose abilities are clearly discrepant. Ideally, a continuum of alternative placement options should be available, so that teachers can develop a plan that builds heavily on students' strengths but also provides remediation and support for social and emotional needs.

Discussion and Recommendations

Many more students may be learning disabled and gifted than anyone realizes. In spite of their high intellectual ability, such students remain unchallenged, suffer silently, and do not achieve their potential because their educational needs are not recognized and addressed. Unlike the situation in which a learning disability is accompanied by another "handicap," students with LD who are gifted present a paradoxical picture of exceptional strengths coexisting with specific deficits. Curiously, this condition carries with it both a blessing and a burden. On the one hand, gifted students with learning disabilities can draw on their gifts and talents to compensate for their disability. With support, understanding, and some instructional intervention, many are able to overcome their academic difficulties and go on to productive, satisfying careers and lives. On the other hand, because they are able to draw on their strengths, for many students the disability is masked while the "drag" on their academic performance prevents them from consistently achieving at high levels. Thus, they are often not identified and continue to be a severely misunderstood and underserved population. When gifted students fail to achieve their potential, whatever the cause, our nation loses a great deal of talent.

When a learning disability coexists with other handicapping conditions, it is often difficult to separate the two, in terms of both underlying causal factors and primacy. This is not an issue in the case of gifted students with learning disabilities. Rather the two conditions are often seen as mutually exclusive by definition. This seeming dichotomy can leave everyone (student, parents, and teacher) feeling frustrated and puzzled. It has hindered program development, teacher training, and research on behalf of gifted students with learning disabilities. Who cares about, and for, these students? In a climate of budgetary concerns, and in light of a growing population of students with severe levels of underachievement, the problems of students who fail to achieve their potential but function at or near grade level do not alarm most educators.

Current regulations and practices for educating special populations need to be reevaluated, because they often fail to include academically talented students with learning disabilities. To improve services for this population, we must move away from using rigid definitions and cutoff scores to specify who receives special programming. Broader definitions of giftedness and learning disabilities are needed to allow for students with both exceptionalities, and programming options should be flexible to meet the individual needs of these students. In actuality, the complex nature of human abilities suggests that all students would benefit from individualized programs to build on their strengths and remediate their weaknesses. However, this is particularly important for gifted students with learning disabilities, whose cognitive profiles are likely to be more variable than other students. Support for the unique social and emotional needs of students who must deal with the large inconsistencies in what they are and are not able to do well is also vital, as is teacher training to assist teachers in understanding the characteristics and needs of gifted students with learning disabilities, as well as strategies to facilitate their learning.

The current movement toward including students with a broad spectrum of abilities and disabilities in the general classroom bears on the issue of meeting the needs of gifted students with learning disabilities. To truly individualize instruction, a broad range of options is needed (e.g., a variety of levels of content and pace, opportunities for remediation and accommodation, etc.). Proponents of inclusion suggest that all of these options can take place in one setting. At present, we have no clear evidence that this is possible (Mather & Roberts, 1994), and it seems overly optimistic to expect that gifted students with learning disabilities who function at or near grade level will be given adequate attention in an environment where others appear to have greater needs. In schools where inclusion is the instructional model of choice, it is imperative to evaluate this issue.

Ultimately, providing a selection of settings (e.g., general classroom, gifted class, LD resource room, special class for gifted students with learning disabilities) and a multitude of service options (e.g., accelerated course work, enrichment, individualized instruction, homogeneous grouping) seems to be a better way to meet the needs of academically talented students with learning disabilities (and perhaps all students). Whatever options are utilized, students with LD who are gifted deserve to have every opportunity to develop their talents and achieve their full potential, and society will benefit from the talents that too often remain unrecognized and undeveloped in gifted children who have learning disabilities.

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Gifted, LD, and Gifted/LD Children's Understanding of Temporal Sequencing on Television

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The investigation reported here reinforces the conceptualization of television viewing as learned activity by highlighting the interrelatedness of children's linguistic, cognitive, and perceptual skills for accurate comprehension of television's most basic narrative device — temporal sequencing. It also explores the likely impact of highly divergent skills and abilities on children's capacity to comprehend television information by sampling children school-labeled as intellectually gifted, learning disabled, and gifted/LD. Findings reveal that gifted and gifted/LD children demonstrated a higher level of comprehension of the basic realistic mode of presentation than nonlabeled and learning disabled children. Nonlabeled, gifted, and gifted/LD children who were high consumers of television were also better able to comprehend the more sophisticated "time-leap" mode of presentation than low and moderate consumers. Regardless of their level of television consumption, learning disabled children could not accurately follow the more sophisticated presentation of temporal sequencing.

In the early 1960s, the most widely accepted summary evaluation of research concerning children and television was provided by Schramm, Lyle, and Parker (1961) and read:

> For some children, under some conditions, some television is harmful. For other children under the same conditions, or for some children under other conditions, it may be beneficial. (p. 1)

Since this statement was first issued, well over 4,000 scientific research articles and governmental reports have been published examining media effects (see Harris, 1994), with special emphasis on the impact of television on young children. The literature continues to be far from definitive regarding what and how children learn from their media interactions, and the consideration of differences among children and the unique conditions under which viewing occurs continue to be viable intervening variables.

Interestingly, exceptional children — "those whose capacity to perform important life activities deviates significantly from the level of performance expected by society" (Lynch & Lewis, 1988, p. 4) — have been largely ignored

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in the literature; research has focused almost exclusively on normal, on nonlabeled, populations. This is somewhat surprising considering that exceptional children, particularly those with high-incidence exceptionalities such as intellectual giftedness or learning disabilities, typically possess cognitive deficiencies or abilities that might greatly influence their comprehension of television information and the conditions under which viewing occurs. Indeed, these children personify the range of differences and conditions cited by Schramm and his colleagues that might best explain media's divergent impact on its young consumers.

Exceptional Children

Although all children deviate in some way from societal expectations, the difference is not considered an exceptional one unless it: (a) is of sufficient magnitude to be judged as either a special ability or disability; (b) occurs in a skill area considered crucial (e.g., communication, learning, interpersonal relationships, locomotion); and, (c) generates adaptive behavior that calls attention to itself (Hallahan & Kauffman, 1986). Recent estimates suggest that between one and eight percent of the school-age population in the United States are children distinguished by an exceptional skill or talent (Passow & Rudnitski, 1993); between eight and 16 percent of the school-age population are distinguished by an exceptional disability (Stone & La Greca, 1990). Of the population of disabled children, the learning disabled comprise approximately 41.7 percent (U. S. Department of Education, 1994). A unique subgroup of these two populations, who possess both superior intellectual ability and a specific learning disability (see Crawford & Snart, 1994), are known as gifted/LD.

The few but growing number of mass communication investigations that have thus far examined exceptional children are largely descriptive in nature. These studies indicate that young, school-age intellectually gifted and learning disabled children typically watch more television (Abelman, 1984; Sprafkin & Gadow, 1986), are attached to more adult-oriented programming and advertising (Abelman & Pettey, 1989; Richert, 1981), and are more likely to watch alone (Abelman, 1992b; Liebert & Sprafkin, 1988) than their nonlabeled counterparts. Collectively, these findings reflect the profile of a potentially vulnerable media consumer.

Unfortunately, even studies specifically seeking to identify developmental differences in children as potential mediators of such televiewing effects as fright responses (e.g. Cantor, 1994), physical aggression (e.g. Geen, 1994), consumer behavior (e.g. Moore, 1990; Young, 1990), moral development (e.g., Bryant & Rockwell, 1994), and social behavior (e.g., Dorr, 1986; Wright, St. Peters, & Huston, 1990) have failed to isolate, recognize, or acknowledge differences associated with an exceptional ability or disability. To date, how exceptional children comprehend and learn from television information has yet to be explored. They are, as has been noted by Sprafkin, Gadow, and Abelman (1992, p. xiv), "truly the forgotten audience."

The investigation reported here addresses this void in the literature. Children with the most high-incidence[1] learning ability and disability — the intellectually gifted, learning disabled (LD), and gifted/LD — and their understanding of one of the most rudimentary and fundamental television production techniques, temporal sequencing, will be examined.

Television Comprehension

The conceptualization of television viewing as a learned activity has gained much support in the last decade. This is particularly true with regard to the attention given to the prerequisite skills and abilities necessary for comprehending televised portrayals and narratives. Over the years, the association between linguistic competence and television literacy has been given particular consideration (see Davis & Walton, 1983; Harris, 1988; Smith, Anderson, & Fischer, 1985). Research by Collins (1982), Huston and Wright (1994), Rolandelli, Wright, and Huston (1985) and Salomon (1979; 1983) for example, found that an individual's comprehension of television information draws on knowledge derived from general experiences with perceptual, cognitive, linguistic, and social phenomena. According to Huston and Wright (1983, p. 46), television's visual and aural displays:

> [A]re analogous to punctuation, capitalization, paragraphing and chapter heading in print… Language is used to organize, segment, and otherwise structure television content [and] children can decode the meaning… using the same linguistic processing strategies and constraints that they draw upon in the presence of live speakers.

Luke (1985, p. 92) also believed that how knowledge is "acquired, structured, and used to process everyday linguistic and non-linguistic information is a critical factor in accounting for children's abilities (or inabilities) to deal with TV's context and symbol system." She further noted that:

> A fundamental aspect of the "meaning" accessible to the viewer is the reliance of this symbol system, no matter how visually and technically complex, upon spoken language and the cultural conventions governing language and action. As with text, the viewer calls into play a variety of linguistic and perceptual skills to make sense of, and actively interpret, the given program. (pp. 93-94).

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[1] Low incidence exceptionalities — those accounting for less than one percent of the general school-age population — include hearing, vision, physical, health, and multiple impairments. It should also be noted that, across all exceptionalities, individuals at the mild end of the continuum outnumber those at the severe end.

Temporal Sequencing

Amidst the various forms, formats, and techniques that constitute the "language" of television, accurate comprehension of a program requires viewers, at the very least, to temporally integrate and coordinate program material. In typical dramatic programming, story line, plot progression, and character development are all relayed through a series of discrete scenes from which coherence must be inferred (Collins, 1979; Krull, 1983). Nonlabeled children's use of temporal order as an organizing principle in their social interactions begins no later than their third year (Bretherton, O'Connell, Shore, & Bates, 1984; Nelson, 1978; O'Connell & Gerand, 1985), and is strongly associated with the development of linguistic competence and performance (Conti-Ramsden & Snow, 1990; Naremore & Hopper, 1990). Later, "content-free" sequential understanding evolves (Case & Khanna, 1981; Nelson & Gruendel, 1981) which allows children to generalize ordering principles to unfamiliar events by their fourth year.

Evidence suggests that the processing and organization of information presented via television is a more complex task for young children. According to Collins (1983, p. 131), simply following normal activity on television is a difficult task for children because "temporal integration [of mediated messages] involves inferences about implicit relations among explicit scenes." Similarly, Simon (1976) has characterized television programs as "ill-structured problems" that require considerable attentional, organizational, and inferential activity by the viewer. Three- and four-year-olds have been found to experience difficulty in tasks that required the sequencing of pictorial presentations of events (Brown, 1976; Gelman, Bullock, & Meck, 1980) and even 5- and 6-year-olds have some difficulty reconstructng sequences of pictures presented in modified (i.e., reversed or scrambled) order (Brown & Murphy, 1975). Calvert & Gersh (1985) and Abelman (1990) found that many nonlabeled four-year-olds who were able to coordinate two or more real-world events in a normal sequence failed to show reliable ordering of two or more televised events linked by editing or other visual techniques.

When considering exceptional populations, it has been found that gifted children are particularly able to recognize the nature of problems, to select strategies that are appropriate for problem-solving, to map higher order of relations, and to distinguish between relevant and irrelevant information (Barb & Renzulli, 1993; Runco & Nemiro, 1994). With regard to language competence and performance, gifted children typically learn to speak and develop sophisticated language patterns well in advance of their nonlabeled age-mates. They may teach themselves to read by age 3 or 4 without direct supervision, and their verbal and reading fluency and comprehension improve rapidly (see Cohn, Cohn, & Kanevsky, 1988; Heller, Monds, & Passow, 1994). The level of complexity and abstraction found in their probes and responses reflects phenomenal perceptiveness and sensitivity to relationships and patterns in knowledge

(Runco, 1994; Sternberg & Davidson, 1985).

Thus, children who are intellectually gifted may be extremely competent when it comes to piecing together televised events. Consequently,

> H1: Young gifted children will be *better able* to engage in temporal sequencing of televised events than their nonlabeled, same-age counterparts.

Learning disabled children, however, have been found to be particularly poor at the aforementiond skills (see Lewis & Lynch, 1988; Sternberg, 1982). Ross (1976) suggested that LD children show a delay in the development of selective attention abilities; these children are slower to learn how to focus their attention upon relevant dimensions or cues of a problem and to establish necessary cognitive schemes for problem solving than their nonlabeled peers. Like younger nonlabeled children, the attending behavior of LD children is more influenced by perceptual salience (i.e., high in movement, intensity, change, and contrast) (Hackett & Sprafkin, 1982; Welch & Watt, 1982) and these children are less able to integrate stimuli from different modalities or stimuli that require the ability to make inferences about implied relationships (Beery, 1967; Van de Voort, Snef, & Benton, 1972; Zendel & Pihl, 1983).

In language, young LD children may experience delays in the development of listening and speaking skills and in the acquisition of knowledge about linguistic structures. LD children tend to lack sensitivity to various patterns of textual organization and to the relative importance of major and minor ideas (Nodine, Barenbaum, & Newcomer, 1985; Scardamailia & Bereiter, 1984; Vallecorsa & Garriss, 1990). Communication problems often result from disorders of language processing and language production (Lewis, 1988; Wiig & Semel, 1976). It is therefore expected that:

> H2: Young learning disabled children will be *less able* to engage in temporal sequencing of televised events than their nonlabled, same-age counterparts.

Interestingly, the gifted child with a learning disability has an erratic arrangement of the above mentioned strengths and weaknesses. However, patterns have emerged from the scientific literature. Studies indicate that gifted/LD children excel on tasks which require the formation of concepts, manipulation of abstract ideas, and synthesis of spatial and visual information but often experience great difficulty with tasks requiring memorization of isolated facts, sequencing, and the decoding and organization of printed material (Abelman, 1995; Fox, Brody, & Tobin, 1983; Swesson, 1994). It is this poor memory of facts and deficient organizational abilities which interferes with school performance of traditional tasks (Baum, Owen, & Dixon, 1991; Bireley, Languis, & Williamson, 1992).

In language, gifted/LD often display high verbal expressive ability and good conceptual understanding. However, these skills operate concurrently with poor performance on language-oriented activities that demand coordination and organizational skills, significant academic underachievement, and frustration (Crawford & Snart, 1994; Gunderson, Maesch, & Rees, 1987). It is therefore expected that:

> H3: Young gifted/LD children will be *less able* to engage in temporal sequencing of televised events than their nonlabeled, same-age counterparts.

Modifications in Temporal Sequencing

It is important to note that the sequencing of events in popular programming is often presented in a modified format, the result of post-production editing. In particular, "time-leaps" are employed. A "time-leap" is a vehicle used to facilitate storytelling and advance action by allowing programmers to eliminate the often extraneous, excessively time-consuming, and generally uninteresting activity of getting from one place to another. This editing technique allows a character to be in one location/scene one minute and a different location/scene the next, thereby compressing real time and jumping ahead into the immediate future (see Abelman, 1989; Newcomb & Alley, 1983).

The prevalence of this technique should not undermine its sophistication. Where normal temporal integration involves "inferences about implicit relations among explicit scenes" (Collins, 1983, p. 131), "time-leaps" present a potentially more difficult task. They require inferences about implicit relations among implied scenes; that is, scenes have been deleted but it must be understood that their activity has nonetheless transpired and contribute to the existing action in the program. Consequently, it is likely that this technique may modify familiar events to the point where they become unfamiliar or meaningless, thereby hindering comprehension by children capable of normal temporal sequencing. Indeed, Bryant and Anderson (1983, p. 6) have suggested that television program comprehension is largely contingent on the establishment and application of cognitive schemata — "a mental structure composed of abstract knowledge reflecting prototypical properties of the individual's experience [with television] as well as through general world experience." Similarly, Abelman and Courtright (1986) noted that a different set of schemata or a more complex application of the same schema is required to allow the viewer to recognize, isolate, and distinguish among various modes of televised narration. Numerous investigations report that real-world experience contributes to the understanding of television presentation reflective of the real world (see Barker, 1985, 1988; Salomon, 1979). It is therefore likely that information which facilitates understanding of telegeneric techniques — codes and cues unique to television, such as the "time leap" — could well be derived from media experience itself. It is expected that:

H4: Nonlabeled and gifted children with higher levels of television consumption will demonstrate a higher level of comprehension of "time-leaps" than those with lower levels of television consumption.

Although high consumption may facilitate comprehension, there is clearly no evidence to suggest that high consumption without the ability to coordinate two or more real-world events is sufficient to comprehend unique forms of television presentation. Suggested Collins (1983, p. 136):

> Children's representations of the content of typical programs reflect not only their cognitive abilities, but also the difficulty of the program material to be comprehended and the store of general knowledge and social expectations built up through media experiences.

Because young LD and gifted/LD children do not possess the prerequisite cognitive skills necessary to accurately comprehend realistically presented temporal sequences on television:

H5: Learning disabled and gifted/LD children with high levels of consumption are *not expected to demonstrate* higher levels of comprehension than learning disabled and gifted/LD children with lower levels of consumption.

Method

Participants

The sample consisted of 36 male and 49 female (N=85) nonlabeled 5-year-olds (range = 5 years 2 months to 5 years 9 months; M age = 5 years 7 months) with a mean IQ of 96.9 (SD=8.65), 47 male and 36 female (N=83) school-labeled intellectually gifted 5-year-olds (range = 5 years 3 months to 5 years 11 months; M age = 5 years 5 months) with a mean IQ of 134.1 (SD=9.08),

Table 1

Means and Standard Deviations of WISC-R Subtest Scaled Scores

WISC-R	**Nonlabeled**		**Gifted**		**LD**		**Gifted/LD**	
Subtest	(N = 85)		(N = 83)		(N = 75)		(N = 60)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Verbal Scale IQ	106.4	11.2	138.1	10.2	91.3	10.6	93.8	11.1
Performance Scale IQ	98.4	11.8	126.2	10.4	97.4	9.9	124.1	10.5

44 male and 31 female (N=75) school-labeled learning disabled 5-year-olds (range = 5 years 6 months to 5 years 11 months; M age = 5 years 8 months) with a mean IQ of 93.2 (SD=9.20), and 32 male and 28 female (N=60) school-labeled gifted/LD 5-year-olds (range = 5 years 2 months to 5 years 10 months; M age = 5 years 7 months) with a mean IQ of 130.8 (SD=8.73). Subjects were drawn from six schools in an urban midwestern community.

All exceptional students met state and local guidelines for placement in special education or pull-out programs. That is, they were individually assessed in intellectual and achievement measures that had a standard score mean of 100 (SD=15). Gifted and gifted/LD children had an intellectual ability in the above-average range, and nonlabeled and LD children had an intellectual ability in the average, as indicated by their full-scale performance on the Wechsler Intelligence Scale for Children – revised (Wechsler, 1974) and standing age-achievement scores that were at least 15 points above and 15 points below, respectively, their expected level of achievement (see Schiff, Kaufman, & Kaufman, 1981; Silver & Clampit, 1990).

Direct assessment of children's linguistic abilities was not required for this investigation, considering that this is the very foundation for identifying and labeling exceptional children. The most common method for school diagnosis[2], the WISC-R, is comprised of a Verbal Scale (which specifically emphasizes language abilities) and a Performance Scale (which measures cognitive processing skills through a series of picture and object tasks). See Table 1 for a sample breakdown.

Prior to the experiment, parents were asked to keep a two-week diary of their child's television viewing behavior. In comparison with A. C. Nielsen's (1994) measures of average audience viewing activity, children viewing: (1) under 1 hour per day were identified as "low consumers;" (2) between 1-4 hours per day were identified as "moderate consumers;" and (3) over 4 hours per day were identified as "high consumers." Among the subjects employed in this investigation, the proportion of low, moderate, and high consumers was: nonlabeled (low = 7%, moderate = 40%, high =53%); gifted (low = 5%, moderate = 31%, high = 64%); learning disabled (low = 4%, moderate = 26%, high = 70%); gifted/LD (low = 4%, moderate = 29%, high = 67%). Distribution of viewership across and within these four categories of learning capability is consistent with the research literature (see Sprafkin, Gadow, & Abelman, 1992).

Subjects in four categories of learning capability, with three levels of television consumption, were exposed to an off-air television scene in one of two randomly assigned formats reflective of a realistic and telegeneric modification ("time-leap") of action. After viewing, subjects were asked to complete the Picture Sequence Task.

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[2] See Lewis (1988). Other individually administered tests of achievement that may also serve as a standard component of the gifted and learning disabled assessment battery include the Peabody Individual Achievement test (Dunn & Markwardt, 1970) and the Stanford Binet Intelligence Scale. Each of these tests focus on linguistic performance.

Materials

Two versions of a commercial television program scene from *The Cosby Show*, which included seven distinctive, logically flowing actions, were used for the experimental stimuli.[3] Each action was shot from a different camera angle, thereby facilitating the division of the scene into seven actions. The first version of the experimental stimuli, taped in real-time (length = 63 seconds), depicted Cliff Huxtable answering a ringing telephone in his livingroom (10 seconds), talking on the phone to a pregnant patient (12 seconds), informing her that he will meet her in is office in a few minutes and hanging up (7 seconds), informing his wife and youngest daughter that he is meeting a patient and walking to his downstairs office (21 seconds), entering the office and walking to his desk (4 seconds), sitting in his desk chair (4 seconds), and greeting the patient as she enters the door (5 seconds).

The second version depicted the same action as the original, but without the three actions showing Cliff informing his wife of his departure and walking to and entering into this office. Instead, there was a "time-leap" edit immediately upon Cliff hanging up the phone, where he next appears sitting in his chair in his office and welcoming a patient (length = 34 seconds), thereby implying his departure from the livingroom and entrance into his office and reducing action to four distinct scenes.

Procedure

Each subject was tested individually by the experimenter in a quiet room in the school building. To ensure that all subjects were capable of engaging the Picture Sequence Task, special education specialists from each of the schools employed in this investigation were consulted and indicated that gifted, LD, gifted/LD, and nonlabeled children should be able to adequately perform the task. To ensure that all subjects knew how to follow the instructions for the Picture Sequence Task that would follow the viewing, each session began with the subject being shown three 8" x 11" pictures of scenes from various popular television programs. They were asked to "point to each picture and, in the best way you can, tell me what is happening here." Also before viewing (but after the pre-test), subjects were informed that they would be watching part of *The Cosby Show*, their familiarity with the show was ascertained,[4] and they were asked to refrain from asking questions during the program. After viewing, subjects were presented with the Picture Sequence Task.[5]

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[3] The experimental stimuli came from the actual taping of NBC's *The Cosby Show*. The first version was the real-time footage when the program was filmed before a studio audience. The second version was the result of professional post-production editing and was the footage actually used in the broadcast program. The program footage was supplied by production executives affiliated with *The Cosby Show*, and incorporated into this investigation three weeks prior to the airing of the program. Consequently, subject familiarity with the exact scene depicted in the stimuli materials was eliminated.

[4] Subject familiarity with *The Cosby Show* was assessed on a four-point scale and revealed

Picture Sequence Task. Seven full-color, 8" x 11" high gloss photographs depicting a moment representative of each of the scenes from the video stimuli (including the three scenes implied by the "time-leap" technique) were extracted from the videotape and used in a picture sequencing task. The seven pictures were shuffled prior to the task so the order was random and unknown to the experimenter and subject. The pictures were laid out in two rows of three and four pictures, respectively.

The children were informed that they were to "put these pictures in the right order, from the first thing that happened in this program to the last, in a way that best tells the story so that I can understand it." They were asked to order the pictures in one long row. After this task, the experimenter said, "point to the first picture and tell me what happened in the program." The experimenter then repeated this procedure until the pictures were exhausted.

A picture sequence score was calculated for each child by comparing the child's picture order to its correct absolute position and to the number of cor-

Figure 2

Mean Comprehension as a Function of Capability and Consumption[6]

Manipulated Characteristics	**Mode of Presentation**	
	Unaltered	**"Time-Leap"**
Capability		
Nonlabeled	9.8_a	5.2_c
Gifted	12.6_b	5.8_c
Learning Disabled	4.2_c	2.6_c
Gifted/LD	12.8_b	4.7_c
Mean Difference	8.6_a	3.2_c
Consumption Level		
Low	8.3_a	3.6_c
Moderate	8.7_a	5.8_c
High	9.6_a	8.6_a
Mean Difference	1.3_c	5.0_c

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that divergent levels of familiarity were evenly distributed across the four categories of learning capability. To see whether familiarity could account for the effect of program format condition on picture sequence scores, a univariate analysis of covariance was carried out and found to be insignificant. Consequently, results from this investigation are not an artifact of familiarity with the stimuli.

[5] The methodology employed in this investigation was adopted from Abelman (1990).

[6] The greater the mean, the higher the comprehension level of the presentation. Scores range from 0 (very low comprehension) to 13 (very high comprehension). Means having no letter in

rectly sequenced adjacent picture pairs. To calculate this score, the pictures were correctly numbered and ordered from one to seven. For each picture, one point was awarded for each in its proper position. In addition, one point was awarded for every picture with a lower number placed to its left. The total picture sequence score was calculated by adding the two parts, resulting in a maximum possible score of 13 for temporal order comprehension.

Results

Picture sequence score were analyzed in a 4 x 3 x 2 (Capability x Consumption x Mode of Presentation) unweighted-means analysis of variance (ANOVA), and subsequent comparisons were performed using the Scheffe method. The analysis revealed a highly significant main effect for capability category, $F(4,293) = 87.14$, $p < .001$. Findings support the first hypothesis, which predicted that intellectually gifted children would demonstrate a higher level of comprehension of the unaltered mode of presentation than nonlabeled children. The second hypothesis, which predicted that nonlabeled children would demonstrate a higher level of comprehension of the unaltered mode of presentation than those classified as LD, was also supported. Interestingly, the third hypothesis was not supported; gifted/LD children demonstrated a higher level of comprehension of the unaltered mode of presentation than nonlabeled children.

As can be seen in the upper portion of Table 2, there exists an increase in mean scores for unaltered presentation across learning capability categories. As expected, no such increase was evident for the telegeneric "time-leap" technique. Interaction contrasts also revealed that the difference between mean ratings of comprehension of the various modes of temporal sequencing on television was significant. These findings suggest that learning capability is highly associated with higher comprehension of the unaltered presentation, but does not necessarily contribute to the comprehension of "time-leaps."

There was also a main effect for mode of presentation (F2, 293) = 34.27, $p<.001$, and a significant interaction of consumption level with mode of presentation, (F4, 293) = 65.95, $p<.01$. As can be seen in the lower portion of Table 2, this interaction derives from the finding that high consumers are capable of higher levels of comprehension of the "time-leap" presentation than both low and moderate consumers.

Interestingly, the data also indicates that the interaction between consumption and learning capability was moderately significant $F(6, 287) = 9.33$, $p < .05$). This suggests that children's level of television consumption significantly contributes to but does not completely explain their comprehension of temporal sequencing as presented on television. That is, nonlabeled and gifted children with higher levels of television consumption were also more accurate in their

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their lowercase subscripts in common differ significantly at $p < .05$ by the Scheffe method. Mean differences having no uppercase letter in their subscript in common differ at $p < 05$.

comprehension of the "time leap" technique, supporting the fourth hypothesis. Gifted/LD children with higher levels of consumption were more accurate in their comprehension of "time leaps," but high consumers classified as LD were not, partially supporting the fifth hypothesis.

Discussion

The period from 1950 to 1990 was the most active in the development of programs and assurance of rights of individuals with exceptional abilities and disabilities. General support for gifted programs rose dramatically in the late 1950s, following the 1957 Soviet launching of Sputnik (see Tannenbaum, 1979). Concern for American advancement in science motivated radical changes in public education, and human intellect became a valuable natural resource worthy of nurturance. With regard to challenged individuals, Lynch and Lewis (1988, p. 31) noted that "the use of legislation and litigation to accomplish the goals of deinstitutionalization, normalization, and right to treatment is the hallmark of this era." In particular, the passage of the Americans With Disabilities Act (1990), the Education for All Handicapped Children Act (1975), along with Section 504 of the Rehabilitation Act (1973), guaranteed disabled individuals equal access to programs and services and provided free, appropriate, public education.

While all this activity was transpiring, television was rapidly becoming the most popular and prevalent mass medium in history, infiltrating American homes at a rate faster than any previous technology. Yet, those social scientists aggressively assessing television's use by and impact on American youth failed to consider homes representative of populations most vulnerable to or capable of learning the most from this medium. Amidst published findings that "the medium can be said to differentially activate or trigger cognitive or emotional response from children with particular cognitive abilities and tendencies" and "the exact nature of these responses depends jointly on the attributes of the medium and on those of the child" (Salomon, 1983, p. 183), those with highly divergent cognitive abilities were not examined. Although it was generally believed that "some forms may be understood better than others, depending on how well they fit the child's capacities for representation" (Huston & Wright, 1983, p. 53), children with exceptional capabilities and disabilities were not assessed. Although the newly passed Children's Television Act (1990) mandates that each station "serve the specific educational and informational needs of children through programming" (p. 104 STAT. 996), the Act does not distinguish between exceptionally abled and disabled children.

The investigation reported here reinforces the conceptualization of television viewing as a learned activity and highlights the interrelatednes of linguistic, cognitive, and perceptual skills for accurate television comprehension. Furthermore, it explores the likely impact of highly divergent skills and abilities on children's capacity to comprehend television information. Findings suggest that the basic sequencing of televised events requires viewers to temporally integrate and coordinate program material, and those not possessing the prerequisite skills and abilities are at a distinctive advantage with regard to the comprehension of story line. Children school-labeled as learning disabled fit this description and cannot comprehend story line as accurately as their nonlabeled counterparts. Consequently, they may also have difficulty drawing inferences about what took place over time and across time leaps, and the connection between motive and consequence may be potentially sacrificed. Given these findings, the concluding remarks in the 10-year update of the Surgeon General's report on children and television (Pearl, Bouthilet, & Lazar, 1982, p. 81) have direct implications for LD children:

> Recognition of the importance of television as a part of a child's growing-up experience has led in recent years to the view that children need to learn something about how to watch television and how to understand it. Much as they are taught to appreciate literature, to read newspapers carefully, and so on, they need to be prepared to understand television as they view it in their homes.

The recent influx in media education projects and the teaching of critical viewing skills (see Brown, 1991) should be directed toward special education students.

Findings from this investigation also indicate that children with exceptional information processing capabilities are capable of more accurate comprehension of sophisticated forms of television content, including programs typically directed at adults. Although often capable of comprehending television information and rapidly developing the skills to process this information at an early age, gifted children may be exposed to themes and behaviors that might be particularly disturbing. Their heightened awareness and perceptiveness may leave them vulnerable to influences that may not affect their nongifted age-mates. The extensive body mass of communication literature that examines parental mediation of television and its impact on what and how children learn from television (see Bryant, 1990) clearly needs to address exceptional populations in general and households with gifted children in particular.

Interestingly, although it is believed that "too often a child's giftedness is lost when that child is categorized as learning disabled" (Swesson, 1994, pp. 25-26), this investigation revealed that gifted/LD children were better able to comprehend television's basic narrative than both nonlabeled and LD children. Clearly, when offered in its most rudimentary form of visual narrative, television is a viable, comprehensible learning resource for these children that can have direct applications in classroom instruction.

The findings reported here also suggest that the comprehension of some of television's more sophisticated visual techniques require skills that cannot be obtained or developed through daily real-world interaction. Narrative devices unique to television, such as the "time-leap," require media experience for higher levels of comprehension, even if children are intellectually advanced and posses exceptional perceptual and linguistic capabilities. Conversely, heavy consumption by children who do not possess fundamental perceptual and linguistic abilities does not facilitate comprehension of telegeneric techniques.

Despite the obvious limitations of this investigation — the employment of a single source stimulus and the divergent length and complexity of stimulus materials — this study reinforces Schramm, Lyle, and Parker's (1961) observation that television is unlikely to impact all children in the same manner because of the diversity that resides in the school-age population. It points to the futility of social scientists classifying children by age or grade without accounting for the highly divergent intellectual and perceptual capabilities of same-age children. Clearly, the investigation reported here represents only the first stage of what should prove to be a rich and important area for future research. With a better understanding of how children process and comprehend television information, insight into the most appropriate use of television in the home and classroom would likely follow.

Notes

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Characteristics of 12th-Grade Students Seriously Deficient in Spatial Ability

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When spatial ability was regressed on a measure of general intelligence in a large national sample of 12th graders, there was a distinct downturn in the regression line at about -2 SD units. A bimodal distribution of spatial ability was found among these low scoring students, suggesting 2 qualitatively different types of individuals. Relative to students of expected spatial ability, those below expected in spatial ability were high on verbal skills and low on performance skills. Students unexpectedly low in spatial ability performed relatively well on cognitive tests that required answering unambiguous questions by retrieving information directly from long term memory, whereas they performed relatively poorly on tests requiring inference and perception of relations among novel stimuli. Students unexpectedly low in spatial ability performed especially poorly at tests involving visual-spatial perception skills. Results were similar for both sexes. The relatively poor performance of those unexpectedly low in spatial ability does not appear to be related to health problems, personality, interest differences, or biographical data. An organic impairment possibly related to lateralization represents a reasonable causal hypothesis for these data.

Examining cognitive tests scores from a large national sample of high school students (Project TALENT, Flanagan et al., 1962), Humphreys, Lubinski, and Yao (1993a) found that among low intelligence 10th-grade boys and girls there was a curious upturn in the regression line on a measure of general intelligence for Vocabulary scores and a simultaneous downturn for Mechanical Reasoning scores. These authors studied this phenomenon by forming two groups among examinees at the low end of the distribution of scores on the intelligence composite. They split the distribution of Vocabulary scores of these selected examinees near the median in each sex to form Low and High Verbal groups. The performance of these Low and High groups in each sex was then observed on other available tests. The High group in each sex had higher means than the Low groups on tests involving retrieval of information from long term memory. Each Low group, in contrast, had higher means than the Low groups on tests involving inference and perception of relations among novel stimuli. Additionally,

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each aberrant High verbal group appeared to have difficulty with tests involving fine perceptual discrimination.

This pattern of test scores among the aberrant groups is similar to that found by Dean, Schwartz, and Smith (1981) in their examination of lateral preference patterns. Learning disability has often been associated with a lack of cerebral hemispheric dominance (Orton, 1937; Zangwill, 1962) and, indeed, in one study Dean, Schwartz, and Smith found non-normal hemispheric lateralization learning-disabled children. In another study they found learning-disabled children to be more bilateral than normal children on factors involving visually guided fine motor activity.

Other researchers have found that individuals very low in spatial ability appear to form a qualitatively different subgroup (Murnaw, Pellegrino, Kail, & Carter, 1984; Lohman, 1988). In a task that involved creating, storing, retrieving, and matching mental representations, Lohman and Nichols (as cited in Lohman, 1988) found that differences between groups of participants medium-low, medium-high, and high in spatial ability were generally quantitative, whereas persons very low in spatial ability were qualitatively different from the other groups. Lohman suggests that individuals very low in spatial ability may have difficulty constructing hierarchically structured mental images.

Humphreys et al. (1993a) expressed dissatisfaction with the arbitrariness of the selection of their groups. Although the results pointed to the existence of two qualitatively different groups, the distribution of Vocabulary scores did not show any tendency toward the bimodality that might have been expected from such groups. Thus the present research was initiated in the hope that a less arbitrary point in the distribution of spatial ability might be found for the definition of two different groups. Groups of students would be formed based on whether their spatial ability scores met the linear expectations of the regression or fell below that expectation. These groups, labeled "Expected" and "Below Expected," would be substituted for the High and Low Verbal groups used previously. Replication in a different high school was also desirable.

The regressions of Spatial Ability on intelligence for all the 12th-grade students from Project TALENT are shown in Figure 1 in which spatial ability is plotted against equal intelligence score intervals. This sample size for each sex of between 35,000 and 40,000 produces smooth data. The intelligence measure is a composite of reading comprehension, arithmetic reasoning, and abstract (figural) reasoning with effective weights of approximately .50, .25, and .25, respectively (Wise, McLaughlin, & Steel, 1979). The Vocabulary test is a measure of general, as opposed to specialized, knowledge of the meaning of words. Spatial ability is a composite of Mechanical Reasoning, Visualization in 2-D, and Visualization in 3-D. Mechanical Reasoning is a pictorial test of the operation of mechanical principles. The Visualization tests measure ability to visualize movement in two or three dimensions. The components of the composite thought to be most closely associated with the theoretical target construct were given the most weight. The weights were defined by the size of the standard deviation after multiplying raw scores by the appropriate constants. These constants are based on a good deal of experience and knowledge of how the tests performed in factor analyses. This experience includes observations of the intercorrelations of the components in numerous data sets, a number of factor analyses, and knowledge of the variances and covariances of the components in the present sample. In order to not overweight the Mechanical Reasoning and to weight Visualization in 3-D more heavily, we used constants of 1,1, and 3, respectively to weight the raw scores of both boys and girls. The weighted standard deviations of the Spatial Ability composites became 4.12, 5.76, and 10.41, for boys, and 3.67, 5.64, and 9.45 for girls. Thus, in terms of content and processes, the two tests (i.e. Vocabulary and Spatial Ability) reflect mastery of two very different domains, i.e., verbal and spatial.

Both the upturn in Vocabulary and the downturn in Spatial Ability break from the predominant linearity at approximately two standard deviations below the mean. Participants below the point of inflection constitute approximately 2% of those 12th-grade students with scores on the intelligence composite. Among the 2% of the sample who fall below the point of inflection, the frequency distribution of Spatial Ability is clearly bimodal, indicating that there may be two distinct kinds of students within this segment of the sample. See Figure 2. This article will attempt to discover the reasons for this non-normal distribution. That is, why do a substantial portion of students score so unexpectedly low on Spatial Ability?

Procedure

Participants

The participants were selected from the Project TALENT Data Bank (Flanagan et al., 1962; Wise et al., 1979), a national probability sample of high school students tested in 1960. The students were in grades 9-12 with almost 100,000 students in each grade. TALENT is a well-known data bank containing a large number of cognitive and self-report measures (see below). For the present study, participants were selected from 12th grade boys and girls.

We first selected everyone who fell below the point of inflection of the Spatial Ability regression. This point was approximately two standard deviations below the mean of the intelligence composite in own-sex norms. Note that this is the same point of inflection of the regression of Vocabulary found by Humphreys et al. (1993a). This procedure produced our sample of 871 boys and 870 girls.

We checked this definition of groups by comparing standard errors of estimate below and above the cutting scores, i.e., the point of inflection. Among the general intelligence score intervals, the standard deviations about Verbal and Space score means are more heterogeneous below the cutting scores than above it. There is an appreciable difference in heterogeneity for Verbal and somewhat less for Space because of floor effects.

Defining the Groups

In this study the distribution of students whose Space score was below the point of inflection provides an obvious cut off point for dividing the boys and girls into groups scoring as expected on Spatial Ability at the 0-3 peak interval on the Space composite. Note that the X-axis labels in Figure 2 indicate Space score interval midpoints. However, to be conservative we raised the cut off point to students scoring less than 9. This differs from the study of 10th grade students where we studied high and low vocabulary groups (Humphreys et al., 1993a). Those groups were selected from skewed distributions, but we observed no obvious cutting score and arbitrarily split the samples near the medians. The Spatial Ability groups, in contrast, can be selected by imposing a less arbitrary cutting score for low and high groups. This division yielded 634 Expected Space boys, 238 Below Expected Space boys, 539 Expected Space girls, and 231 Below Expected Space girls.

The majority of participants in the 0-3 peak interval have scores of zero on the Spatial Ability composite: 187 boys and 175 girls. A score of zero indicates that the subject marked at least one item on each of the three tests in the Space composite (even if they marked only one item and got that item wrong). If students marked no items on even one of the tests used to form the composite, they were excluded from the sample. We recognize that there is a floor effect, that easier items could be constructed to assess spatial ability at a very low level. However, the highly probable effect of adding a number of easier items to each of the spatial tests forming the composite would be the addition of a near-constant to all scores 9 and above in the group representing the linear extension of the regressions. The easier items could not destroy the increasing frequencies now found in scores 8 and below. For reasons to be discussed, we do not believe these zero scores to be due to carelessness or lack of motivation.

The 12th grade means and standard deviations of Space are 56.76 and 17.19 for boys, and 45.84 and 15.60 for girls. Thus, a score of zero is more than 3 SD units below the mean for boys and almost 3 SD units below the mean for girls, which ordinarily provides adequate discrimination among examinees. That is, these distances between the means and a score of zero indicate that the Space composite is an adequate measuring instrument for most research purposes in the 12th grade, including the definition of different spatial small groups at the low end of the distribution of general intelligence.

Dependent Variables

The Project TALENT Data Bank contains more than 50 cognitive tests, 10 personality and 17 interest self-report scores, and 18 scores developed from biographical data items. We shall report means on almost all of them either individually or in composites. All means will be in standard scores obtained in own-sex distributions of all 12th-grade boys and girls. All differences between cognitive test means are significant at $p < .0001$. Some readers may object to the age of this data set. However, although the means of our variables may have changed since 1960, relations among continuous individual difference variables such as abilities, interests, and personality are more robust to cultural changes.

Table 1

Standardized Means and Differences in Means of Expected and Below Expected Space Groups of Number Right on Various Cognitive Tests

		Boys			**Girls**	
	Exp	**Below**	**Diff**	**Exp**	**Below**	**Diff.**
Intelligence components						
Reading Comprehension	-2.26	-3.03	0.76	-2.35	-3.27	0.92
Abstract Reasoning	-2.16	-3.10	0.94	-2.20	-3.02	0.83
Arithmetic Reasoning	-1.84	-0.47	-1.37	-1.64	-0.28	-1.36
Expected group superiority						
Disguised Words	-1.33	-2.16	0.83	-1.58	-2.37	0.79
Word Functions	-1.00	-1.92	0.92	-1.17	-2.03	0.86
Creativity	-1.45	-2.32	0.87	-1.38	-2.30	0.93
Table Reading	-0.45	-1.44	0.99	-0.68	-1.75	1.07
Clerical Checking	-0.12	-2.43	2.31	-0.13	-2.79	2.66
Object Inspection	-0.53	-3.03	2.50	-0.76	-3.40	2.64
Below Expected group superiority						
Vocabulary	-1.97	-0.39	-1.58	-1.76	-0.31	-1.44
Academic Information	-1.99	-0.46	-1.53	-1.77	-0.31	-1.46
Nonacademic Information	-1.96	-0.42	-1.54	-2.09	-0.33	-1.76
Memory for Words	-0.93	-0.21	-0.72	-1.09	-0.04	-1.05
English	-2.06	-0.62	-1.44	-2.30	-0.58	-1.72
Mathematics	-1.47	-0.51	-0.93	-1.38	-0.31	-1.07
Arith. Computation	-1.54	-0.32	-1.22	-1.74	-0.26	-1.48
Screening Scale	-1.97	-0.34	-1.63	-2.18	-0.31	-1.87

Note: Test scores were standardized in each sex separately.

For example, the SAT over its history has shown highly similar correlations between its two components, with other tests, and with grades. Similarly, the Strong interest test still sorts out students in the same fashion and the five factor structure of personality is found today in tests just as it was in the 1950s in peer ratings. Further, the factor structure of cognitive abilities is the same over long periods of time, the same for men and women, and appears to be the same across cultural, ethnic, and racial groups (Carroll, 1993). Additionally, the size and scope of this data set are unlikely to be replicated in a more recent sample.

Results from Cognitive Test Data

Pattern of Means on the Intelligence Components

Intelligence component scores were standardized within each sex separately and are reported in Table 1. Given that the general intelligence scores for this sample are more than two SD units below the means of 12th-grade boys and girls, and given the linearity shown in Figure 1 above the cutting score for our two groups, it is reasonable to expect that the components of the intelligence composite would all be close to -2.00. This is true of the Expected Space groups. The aberrant Below Expected Space groups, however, show a different pattern. Their scores on Reading and Abstract Ability are unexpectedly low at approximately -3.00, and Arithmetic Reasoning is unexpectedly high at approximately -.30 to -.50. The statistical difference between our two groups in the pattern of their scores on the components of the general intelligence composite suggests a psychological difference between the groups. The patterns do not differ by sex. Readers must keep in mind these component score means as we continue to refer to Expected and Below Expected Space groups. Our groups are all below the mean of 12th-grade students.

Differences in Means on the Cognitive Tests

The Below Expected Space groups performed better than the Expected Space groups on Academic Information, which covers a broad range of factual information about topics studied in school, such as vocabulary, mathematics, social studies, and the sciences (see Table 1.) They also performed better than the Expected Space groups on the Nonacademic Information, which covers a broad range of general information much of which is likely learned out of school, e.g., art, medicine/health, foreign travel, accounting, etiquette, fishing, foods. See Table 2 for examples of both types of Information Test Items.

Table 2
Information Test Items

Which of these is made of glass?

A. Tree, B. Mirror, C. Bread, D. Hammer, or E. Book

Which of these numbers is a perfect square?

A. 3, B. 5, C. 7, D. 9, or E. None of the Above

To retain means to

A. get, B. give up, C. keep, D. lose, E. create

The device designed to prevent an overload of an electric circuit is called a

A. rheostat, B. fuse, C. voltmeter, D. plug, or E. cell

Yeast is used in making

A. pie, B. cornbread, C. cream puffs, D. pan rolls, or E. oatmeal cookies

Which of these states is mostly a peninsula?

A. New York, B. Florida, C. Texas, D. Maine, or E. Illinois

Atoms combine to form

A. electrons, B. protons, C. ions, D. nuclei, or E. molecules

In baseball, fouls count as strikes unless there are

A. two strikes, B. no men on base, C. three men on base, D. three balls, or E. two out

Which of these foods grows above ground?

A. Peas, B. Radishes, C. Carrots, D. Potatoes, or E. Peanuts

Which of these is closest to the sun?

A. Earth, B. Saturn, C. Pluto, D. Mercury, or E. Jupiter

These tests are tests of factual knowledge. This information can be directly retrieved from long term memory with little inference required. Additionally, the Below Expected Space groups scored higher than the Expected Space groups on Memory for Words, which measures a type of rote memory — the ability to memorize foreign words corresponding to common English words. The Below Expected Space groups also achieved higher scores than the Expected Space groups on the High School Mathematics tests and on English tests, which consisted of Spelling, Capitalization, Punctuation, English Usage, and Effective Expression. These tests, along with Arithmetic Reasoning, also require retrieval from long term memory, but the content may be more validly characterized as rules than information. The Below Expected groups also scored higher than the Expected groups on the Screening Scale, which was designed to locate thoughtless responding. The Screening Scale is discussed in more detail below as one of several indications that the Below Expected groups were not simply careless or unmotivated.

The Expected Space groups scored higher than the Below Expected groups on Disguised Words, Word Functions in Sentences, and Creativity. Disguised

Words requires the ability to puzzle out the meaning of a crudely misspelled word that has to be identified from context and appearance. Word Functions in Sentences requires the ability to recognize the function of a word within the structure of one sentence, and to identify the word that serves that same function in another sentence that deals with a completely different subject matter. Creativity requires the ability to find ingenious solutions to a variety of practical problems. These tests require inference and the perception of relations among novel ambiguous stimuli.

These tests are tests of factual knowledge. This information can be directly retrieved from long term memory with little inference required. Additionally, the Below Expected Space groups scored higher than the Expected Space groups on Memory for Words, which measures a type of rote memory - the ability to memorize foreign words corresponding to common English words. The Below Expected Space groups also achieved higher scores than the Expected Space groups on the High School Mathematics tests and on English tests, which consisted of Spelling, Capitalization, Punctuation, English Usage, and Effective Expression. These tests, along with Arithmetic Reasoning, also require retrieval from long term memory, but the content may be more validly characterized as rules than information. The Below Expected groups also scored higher than the Expected groups on the Screening Scale, which was designed to locate thoughtless responding. The Screening Scale is discussed in more detail below as one of several indications that the Below Expected groups were not simply careless or unmotivated.

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Speeded Tests

There were four speeded tests. These Clerical and Perceptual Aptitude speeded tests measure abilities other than general intelligence (Humphreys et al., 1993a). Therefore there is no expectation that either group would score -2.00 SD units below the mean as they do on the general intelligence measure. Three of the speeded tests involve visual perception skill. Table Reading measures speed and accuracy in the non-computational task of reading information from tables. Clerical Checking involves comparing pairs of names to determine whether they are identical. Object Inspection measures the ability to spot differences in drawing of small objects quickly and accurately. The number right for each speeded test is reported in Table 1. In contrast to the Expected Space groups, the Below Expected Space groups scored well below -2.00 SD units below the mean on the tests most involving speeded visual perception, Clerical Checking and Object Inspection, a result not predictable from their scores on the general intelligence measure.

Among the speeded tests at which the Below Expected Space students did very poorly, it is informative to note the differences in mean number of speeded items attempted and the mean number of errors. See Table 3. The Below Expected Space groups attempted to answer many fewer speeded items than the Expected Space groups and they were much more likely to answer incorrectly. This pattern of responding indicates that the Below Expected Space students knew what they could not answer these items correctly and did not risk getting penalized for wrong answers by guessing. In contrast, the Expected Space students did attempt many more items, about some of which they were uncertain, and answered the majority of them correctly. The Below Expected Space groups did better than the Expected Space groups on the fourth speeded test, Arithmetic Computation, which measures ability to perform the four basic numerical operations quickly and accurately. Like the Information Tests on which the Below Expected Space groups were superior to the Expected Space groups, this test involves straightforward retrieval of facts from long term memory.

Table 3

Raw Score Means and Standard Deviations on Speeded Tests of Numbers of Attempts and Errors

	Boys				Girls			
	Exp		Below		Exp		Below	
	Mn	SD	Mn	SD	Mn	SD	Mn	SD
Expected group superiority								
Table Reading: Attempts	20.74	21.28	3.02	5.24	16.26	15.77	2.99	5.00
:Errors	10.98	16.63	2.54	4.15	7.39	11.68	2.35	2.89
Clerical Checking: Attempts	46.62	20.63	4.35	10.62	47.77	20.07	4.10	10.34
:Errors	10.34	9.05	2.55	4.08	8.47	7.18	2.12	3.11
Object Inspection: Attempts	24.26	10.28	1.03	2.84	23.73	9.31	1.28	4.57
:Errors	4.72	6.66	0.67	1.38	4.66	5.77	0.64	1.63
Below Expected group superiority								
Arith. Comp: Attempts	33.81	16.47	41.16	11.83	31.06	13.59	41.66	11.39
:Errors	10.19	11.69	4.38	7.83	8.19	8.99	3.35	6.66

Possible Confounds

A possible confound exists in that all of the tests in Table 1 on which the Expected Space groups were superior to the Below Expected groups appeared in one test booklet administered in a half-day session of the two days of test administration. However, there were valid a priori reasons for these tests to be administered together. In contrast to the tests in the other three test booklets, these tests had complex instructions and several practice problems, and contained much graphical material. Each test booklet was typically administered to all grades in the same half-day and members of the Expected and Below Expected groups are widely scattered in terms of identification number, state of residence, rural-urban location, community size, and ethnicity. Thus, it is highly unlikely that something about the administration of this booklet explains the performance differences between the groups. Additionally, if something general about the booklet was causing a subgroup of students to do poorly on the tests in that booklet, one would not expect the Space groups to differ within the booklet. However, note that among the speeded tests, Below Expected Space groups did very poorly on exactly the test which would be expected to relate most highly to spatial ability, i.e., Object Inspection (see Table 1). Responses to the health questionnaire items of the high verbal groups in the 10th grade were examined and no differences found (Humphreys et al., 1993a).

An additional analysis of a possible confound, lack of motivation, was undertaken on our 12th-grade sample. There are some students (182 boys and 174 girls) who were present for the administration of this booklet (indicated by having a score for at least one of the tests in this booklet), but who were not included in the Below Expected or Expected groups because they are missing one or more components of the general intelligence or Space composites. That is, they did not attempt to answer any items on one or more of the tests necessary to form the composites. These students were *not* assigned a score of zero on the test. Examination of the numbers of students taking each test in this booklet indicates that students did not randomly skip some tests. More of them did not attempt precisely those that tests would be expected to be the most difficult for individuals with low spatial ability. Of the two general intelligence components in this booklet, 82 of the boys attempted Reading Comprehension, whereas only 31 attempted Abstract Reasoning, which is more closely associated with spatial ability. The numbers are similar among the girls, 88 and 45, respectively. Of the three components in the Spatial Ability composite, approximately twice as many boys and girls attempted Mechanical Reasoning and Visualization in 2-D as attempted Visualization in 3-D. Frequencies for the boys are 69, 76, and 34, respectively. Frequencies for the girls are 78, 78, and 38, respectively. Among the speeded tests about twice as many boys and girls attempted Table Reading and Clerical Checking as attempted Object Inspection. Frequencies for the boys are 77, 71, and 47, respectively. Frequencies for the girls are 80, 77, and 47, respectively. Relative to the total numbers of students scoring -2 SD units below the mean in general intelligence, there were very few of the students taking this test booklet and having scores on the intelligence and spatial composites who gave up without trying.

The Screening Scale (See Table 1) was designed to allow for the elimination of examinees who might be unmotivated and were answering randomly or thoughtlessly. It includes the answers to some questions in the Information Tests such as "how many days in a week?" that should have been answered easily. The Below Expected Space groups performed better than the Expected

Table 4

Raw Score Means, Standard Deviations, and Intercorrelations Among Some Cognitive Tests

Expected Space Groups

	Boys		1	2	3
	Mn	SD			
1. Disguised Words	6.07	3.76		14	05
2. Word Functions	5.05	2.39	10		12
3. Reading Comp.	8.48	3.40	13	22	
4. Creativity	3.94	2.25	17	19	18
5. Abstract Reasoning	3.07	1.84	-01	-17	-46
6. Table Reading (R-W)	-1.05	19.93	08	-03	-01
7. Clerical Checking (R-3W)	5.24	32.16	09	-06	-02
8. Object Inspection (R-W)	14.85	12.88	08	-04	-08
9. Academic Information	72.62	25.92	42	12	18

Below Expected Space Groups

	Boys		1	2	3
	Mn	SD			
1. Disguised Words	0.18	1.11		42	54
2. Word Functions	0.11	0.55	48		84
3. Reading Comp.	0.27	0.84	42	79	
4. Creativity	0.19	0.74	70	35	24
5. Abstract Reasoning	0.24	1.10	53	13	07
6. Table Reading (R-W)	-2.07	3.37	-26	-44	-41
7. Clerical Checking (R-3W)	-5.84	12.94	01	-23	-16
8. Object Inspection (R-W)	-0.31	2.40	45	72	63
9. Academic Information	133.63	41.95	-2	-16	-16

Note: Boys are below, girls above, the diagonal in the correlation matrices. Decimal points are

Space groups on the Screening Scale indicating that the Below Expected Space groups did not show a general pattern of random responding. Additionally, some of the biographical information indicates that the Below Expected Space students were not less motivated than the Expected Space students. See the "Background Scores" section below.

4	5	6	7	8	9	Girls	
						Mn	SD
13	03	08	15	05	28	6.03	4.07
04	-03	06	03	03	10	5.17	2.33
10	-45	02	03	-03	19	9.72	3.28
	-02	01	06	06	12	3.75	2.08
-10		07	03	10	-06	2.62	1.66
-00	03		30	37	19	1.56	15.29
02	05	35		32	09	13.90	28.24
01	12	34	26		11	14.41	11.37
15	-04	10	08	01		65.26	22.01

4	5	6	7	8	9	Girls	
						Mn	SD
36	80	22	23	49	-22	0.32	1.57
42	32	-13	03	42	-22	0.17	0.80
38	44	24	21	68	-27	0.43	1.78
	59	-04	01	25	-20	0.13	0.59
52		29	26	49	-20	0.15	0.79
-25	-04		41	67	-01	-1.71	4.40
-26	00	51		45	-02	4.36	11.09
24	05	-08	08		-11	0.00	3.84
-21	-25	-02	-02	-21		118.06	35.51

omitted for correlations.

Intercorrelations Among Some Cognitive Tests

Listed in Table 4 are the intercorrelations among the cognitive tests on which the Below Expected Space groups performed poorly relative to the Expected Space groups. Table 4 also includes an academic information composite on which they did quite well. A formula score, which penalizes wrong answers, was used in the correlations involving the three speeded tests (Table Reading, Clerical Checking, and Object Inspection) because it summarizes in one number the information from the three other scores available for the speeded tests (the number right, R, the number wrong, W, and the number of attempts).

For the Expected Space groups, the intercorrelations of the eight tests on which the Expected groups are relatively superior to the Below Expected are mainly trivial in size. A notable exception is the communality among the speeded tests. The variance of these speeded tests is not appreciably affected by the curtailment on the Intelligence composite. The negative correlation between two components of the Intelligence composite are spurious, arising from the method of selecting the groups. The correlations of the sole example of a test on which the Expected groups were relatively inferior, i.e., Academic Information, is representative of that set of tests as a whole (data not tabled). Those correlations are attenuated at the level expected by the restriction of range of intellectual talent.

For the Below Expected Space groups, the correlations among the speeded tests do not define a speed factor in the sample of boys, but do define a substantial one in the sample of girls. The correlations among the other tests on which the Expected groups were relatively superior to the Below Expected groups show a good deal of common variance. However, the correlations are not so high, nor so even in size, that blocks of examinees performed uniformly on every test. These tests in the Below Expected groups have something in common that describes a qualitative difference from the Expected groups.

There is another pattern of correlations that indicates that the Below Expected groups are qualitatively different from the Expected Groups. For the Below Expected groups, the correlations between the cognitive tests on which they are superior to the Expected groups and the cognitive tests on which they are inferior to the Expected groups are low, and tend to be somewhat negative (data not shown). To illustrate this pattern, we have included Academic Information as a representative example of one of the tests on which the Below Expected Space groups are superior to the Expected Space groups. Additionally, only the tests on which the Below Expected groups are relatively superior have variances and intercorrelations representative of the 12th grade as a whole. All correlations involving variates on which the Below Expected groups are relatively inferior involve badly skewed distributions. The degree of skewness precludes the testing of differences among these correlations.

Table 5

Standardized Means and Differences in Means of the Expected and Below Expected Space Groups on Personality Tests

	Boys			Girls		
	Exp	Below	Diff.	Exp	Below	Diff
Below Expected group superiority						
Sociability	-0.50	-0.09	-0.40	-0.55	-0.20	-0.35
Social Sensitivity	-0.41	-0.06	-0.35	-0.79	-0.01	-0.80
Impulsiveness	0.08	0.02	0.07*	-0.10	0.08	-0.18
Vigor	-0.44	-0.12	-0.32	-0.45	-0.21	-0.24
Calmness	-0.62	-0.16	-0.45	-0.62	-0.16	-0.50
Tidiness	-0.43	-0.10	-0.33	-0.64	-0.13	-0.51
Culture	-0.26	-0.14	-0.13*	-0.64	-0.14	-0.51
Self-confidence	-0.55	-0.06	-0.49	-0.44	-0.07	-0.37
Mature Personality	-0.44	-0.14	-0.29	-0.50	-0.22	-0.28
Leadership	0.08	-0.03	0.11*	0.03	-0.07	0.10*

Note: *No significant group differences. Test scores were standardized in each sex separately.

Reports from Self-report Questionnaires

The Project TALENT data contains a variety of self-report measures that might shed some additional light on how these two groups of participants differ from their cohorts. The two groups will be compared with the entire 12th-grade sample as a baseline. Again, scores are standardized within sex. There are sex differences on some of the measures. Remember that these measures were taken in the 1960's. Changing cultural norms may have caused these self-report means to change since then, but the structure of the means within gender is less likely to have changed (Carroll, 1993).

Personality

As Table 5 indicates, the groups differ on many of the personality variables in Project TALENT. The Below Expected Space means are near the mean of all 12th-graders, whereas the Expected Space means are lower at approximately ½ SD unit below the whole group mean. With the possible exception of Impulsivity, all traits are evaluatively positive. Thus, in general, the Below Expected Space students have a more positive self-concept than the Expected Space students. More importantly, the Below Expected Space boys and girls resemble average 12th-grade students.

Interest Tests

The TALENT Interest Inventory asks students how well they would like a variety of occupations and interests, disregarding educational requirements, salary, social standing or other factors. These items have been grouped into 17 broad occupational categories. See Table 6. Among both boys and girls, the Below Expected Space group scores are consistently very close to the mean of the 12th-graders as a whole. The Expected Space boys, on the other hand, indicate an above average interest in most categories. The Expected Space girls show a different pattern. They are less interested than average in the Mechanical-Technical, Skilled Trade, and Labor categories, with the other categories scoring closer to the mean. Like the Below Expected Space boys, the Below Expected Sapce girls are consistently very close to the mean of 12th-graders.

Table 6

Standard Means and Differences in Means of Expected and Below Expected Space Groups on Interests

		Boys			**Girls**	
	Exp	**Below**	**Diff.**	**Exp**	**Below**	**Diff**
Physical Science	-0.17	-0.10	-0.07	0.09	-0.07	0.16
Biological Science	0.08	-0.13	0.21	-0.09	0.02	-0.11
Public Service	0.19	0.07	0.12	0.16	0.07	0.09
Literary-linguistic	0.25	-0.11	0.36	-0.21	0.00	-0.21
Social Service	0.44	-0.05	0.50	-0.10	-0.03	-0.07
Art	0.14	-0.01	0.15	-0.41	-0.06	-0.35
Music	0.43	-0.05	0.47	-0.01	-0.06	0.05
Sports	-0.04	-0.06	-0.01	-0.18	-0.03	-0.15
Hunting-fishing	-0.14	-0.03	-0.11	-0.14	0.05	-0.19
Business Management	0.29	-0.02	0.31	0.10	0.08	0.03
Sales	0.42	-0.04	0.47	0.17	0.16	0.01
Computation	0.27	-0.05	0.32	0.14	0.02	0.12
Office Work	0.72	-0.04	0.75	0.16	0.11	0.05
Mechanical-technical	0.23	0.05	0.18	0.33	0.00	0.27
Trades	0.89	0.11	0.78	0.54	0.07	0.47
Farming	0.15	0.01	0.16	-0.11	-0.05	-0.05
Labor	0.90	0.06	0.84	0.54	0.05	0.49

Note: Test scores were standardized in each sex separately.

Background Scores

Table 7 presents biographical information on these students. The direction of the group differences is similar for both sexes. All groups are below average in socioeconomic status (SES), but the Below Expected Space groups are significantly higher than the Expected Space groups. The Expected Space group SES means are about what would be expected in a group more than two standard deviations below average in intelligence. Thus, low SES does not explain any deficits of the Below Expected Space groups. It may explain their superior test scores as SES is more highly correlated with general intelligence than with Spatial Ability. The Below Expected Space groups took more difficult high school courses than the Expected Space groups, perhaps because their high Vocabulary scores and higher SES led parents and teachers to expect more of them. The Below Expected Space groups received more guidance outside of school and had better study habits than the Expected Space groups, which indi-

Table 7

Standard Means and Differences in Means of Expected and Below Expected Space Groups on Biographical Data

	Boys			Girls		
	Exp	**Below**	**Diff.**	**Exp**	**Below**	**Diff**
Socioeconomic status	-0.99	-0.20	-0.79	-1.10	-0.13	-0.97
Curriculum	-0.60	-0.26	-0.34	-0.44	-0.08	-0.35
Solid courses	-0.74	-0.26	-0.48	-0.66	-0.14	-0.52
Grades	0.05	-0.23	0.28	-0.20	-0.23	0.02
H. S. guidance	0.12	0.11	0.00	-0.07	-0.08	0.01
Non-H.S. guidance	-0.59	-0.03	-0.55	-0.83	-0.20	-0.63
Study habits	-0.52	-0.18	-0.34	-0.80	-0.38	-0.42
Writing Skills	-0.17	-0.19	0.02	-0.43	-0.10	-0.33
Reading Skills	-0.50	-0.16	-0.34	-0.55	-0.10	-0.45
Extra reading	-0.02	-0.06	0.04	-0.14	-0.13	-0.01
Variety of organizations	1.07	0.04	1.03	0.76	0.09	0.67
Participation	0.85	-0.04	0.90	0.47	0.02	0.46
Variety of hobbies	0.31	0.07	0.24	0.21	0.00	0.21
Participation	0.45	0.17	0.29	0.14	-0.05	0.19
Sports	-0.48	-0.08	-0.41	-0.50	-0.06	-0.44
Leadership	0.09	0.03	0.07	-0.18	-0.04	-0.14
Social Life	-0.14	0.23	-0.37	-0.57	0.16	-0.74
Work	-0.07	0.30	-0.37	0.02	0.08	-0.06

Note: Test scores were standardized in each sex separately.

cates that they are not less motivated than the Expected Space groups. Because the Below Expected Space groups were higher in SES than the Expected Space groups, they were in a better position to get more out-of-school guidance. The Below Expected Space groups perceived themselves as better readers than did the Expected Space Groups, which may be true when they are not pressed for time. As the results of the speeded tests indicate (See Table 3), the Below Expected Space groups do perform on other tasks at a slower pace. The Below Expected Space groups participated in more sports and had more active social lives than the Expected Space groups. The Below Expected Space groups reported less extensive participation in non-sports extra-curricular activities and hobbies than the Expected Space groups. Humphreys, Lubinski, and Yao (1993b) found that spatial ability was associated with the tendency to choose hobbies that involve creating, shaping, or transforming objects, i.e., hobbies that involve spatial visualization and manipulation.

Discussion

Many explanations of why the Below Expected groups scored so unexpectedly low in spatial ability were considered and ruled out. Among these were poor health, personality, motivation, occupational interests, SES, high school courses taken, adult guidance, study habits, and the test booklet confound. Regarding the test booklet confound, first, it seems unlikely that something about the test booklet administration could explain the group differences when members of *both* Expected and Below Expected groups were widely scattered in terms of state of residence, rural-urban location, community size, and ethnicity. Second, if something general about the booklet were causing a subgroup of students to do poorly on the tests in that booklet, one would not expect the Space groups to differ *within* the booklet as was found among the speeded tests. Third, if a small group of students had decided not to cooperate with the administration of the test, highly similar numbers of boys and girls would not be expected. A small number of omits occur on most items of the student information questionnaire. The incidence of omission is negatively related to intelligence at a low level, and to sex as well. Girls fail to answer an item appreciably less frequently than boys. Fourth, Below Expected groups did not randomly skip some tests. They skipped precisely those tests that would be expected to be the most difficult for individuals with low spatial ability. Fifth, intercorrelations among the tests in this booklet on which the Below Expected groups did poorly indicate that there is some common factor underlying them for the Below Expected groups, but not for the Expected groups.

Sixth, the patterns of differences between means in Table 1 that revealed seeming qualitative differences between Expected and Below Expected groups is reinforced by the very different patterns of correlations within and between the two sets of tests. Seventh and lastly, the patterns of means on the personality, interest, and background scores also reinforce a conclusion that the Expected and Below Expected groups represent very different kinds of people. In all of these self-report measures, Below Expected examinees have scores distributed very similarly to those of the typical 12th-grade student. Having been unable to produce any alternative hypothesis, we turned to a deficit in broadly defined spatial ability.

The pattern of cognitive test scores among the Below Expected Space groups is analogous to a discrepancy between verbal skills and performance skills used in the disability literature (Sattler, 1982). That is, relative to the Expected Space groups, the Below Expected Space groups are high on verbal (e.g., vocabulary, general information, airthmetic reasoning, language tests) and low on performance (e.g., Disguised Words, Word Functions in Sentences, Creativity, speeded visual functions, Spatial Ability). Verbal skills are dependent on the child's accumulated experience, and usually require an automatic response with what is already known. Performance skills, on the other hand, are more dependent on the child's immediate problem-solving ability and require the child to meet new situations and apply past experience and previously acquired skills to a new set of demands (Sattler, 1982). Sattler divides learning disabled children into two groups (using the WISC-R). Those whose verbal scores are better than their performance scores tend to do better on verbal and auditory perceptual tasks than those learning disabled children whose performance skills are better than their verbal skills (Sattler, 1982). However, learning disabled children whose verbal skills are better than their performance skills tend to be more impaired neurologically, and have impaired finger differentiation, constructional ability and left-right orientation.

The left-right impairment was also found among learning disabled children by Dean, Schwartz, and Smith (1981). More specifically, learning disabled children were more bilateral on tasks involving guided fine motor activity than on other tasks. This parallels our data indicating poor functioning among the Below Expected Space groups on tests involving visual skills. Dean, Schwartz, and Smith also found that mixed dominant children were deficient in spatial abilities and verbally more adept than normally lateralized learning-disabled children. This suggests that the Below Expected Space groups may have poor or non-normal lateralization.

The Project TALENT data do not include a test for hemispheric lateralization. However, among students with low general intelligence scores, there is a very clear division of groups into those performing as Expected and those performing Below Expected in Spatial Ability. Unlike the study of 10th-grade students where we studied high and low vocabulary groups (Humphreys et al., 1993a), the distribution of Spatial Ability scores provides an obvious separation point. Thus, the present results are more definitive than the 10th-grade study. The present study replicated the previous results. That is, among the low-achieving students there are two distinct types of individuals. Below Expected

Space students perform relatively well on a range of untimed cognitive tests that require answering unambiguous questions by retrieving information or verbal rules directly from long term memory. They perform relatively poor on tests requiring inference and the perception of relations among novel stimuli. Below Expected Space students performed relatively poorly on speeded tests, and progressively worse the more the test involved visual perception skills. The Below Expected Space groups relative low performance does not appear to be explainable by health problems, nor by personality or interest differences as they resemble average 12th-grade students in these respects. Below Expected Space groups do not appear to be less motivated than the Expected Space groups. None of the biographical data explains the poor performance of the Below Expected Space Groups. The interpretation of the results does not vary by sex of student or grade in high school.

There are two broad classes of mental retardation, familial and organic. The performance of individuals with the milder, familial type (IQ in the 50 to 69 range) reflects normal intellectual variability that is likely to be the result of normal polygenic variation, or of the interaction of heredity and environment. The organic type of mental retardation is primarily more severe (IQ below 50), but is also seen in milder forms. The parents of individuals with familial retardation have below average IQ, whereas parents of individuals with organic retardation show a normal distribution of IQ. Although SES is only moderately correlated with IQ, *mean* SES can be equated with mean IQ. For one thing, the sample is large and representative both of the students and their parents in the entire population. Thus, the parents of our Below Expected Space groups had normal distributions of IQ. Thus, Below Expected Space groups show many characteristics of being average high school students, but are wiped out on spatial tasks as would be expected of an organic defect similar to organic mental retardation.

In support of our speculation regarding an organic defect, genetic researchers have recently linked a deficiency in a particular visuospatial ability to a specific gene deletion (Frangiskakis, et al., 1996, in Rowe, 1996).

Note

Note, however, that the pattern of the defect responsible for the performance of our Below Expected space group differs from organic retardation in one fundamental respect: spatial visualization is only one of the essential components of the construct of general intelligence. It has been consistently reported that verbal and spatial abilities show a differential relation to left and right hemispheres, respectively, but in the normal human these abilities are substantially correlated. Left and right hemispheres are integrated so that intellectual functioning is indeed mainly general, even though there are important differences in the pattern of the several abilities contributing to the scores on a measure of general intelligence.

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Family Therapy With Intellectually and Creatively Gifted Children

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Few family therapists have expertise in the psychology of giftedness, and little research has been conducted to determine the effectiveness of family therapy with talented children and their families. The purposes of this paper are: (1) to provide family therapists with information on the unique psychosocial stressors associated with giftedness and (2) to stimulate further research and development on the efficacy of family therapy in alleviating distress and actualizing potential in gifted and talented children and their families. The paper provides a critical overview of the existing research literature on gifted children and their families. First, current conceptualizations of giftedness are described. Then the research literature on the characteristics of intellectually and creatively gifted children and their families is reviewed with an emphasis on the endogenous (individual) and exogenous (systemic) factors that can create or exacerbate psychosocial problems. Finally, we suggest an eclectic, eco-systemic approach to three common concerns that bring gifted children and their families to therapy.

Gifted children, especially the most highly talented, often need specialized counseling services to deal with psychological problems related to their giftedness and actualize their potential (Colangelo, 1997; Genshaft, Birely, & Hollinger, 1995; Kerr, 1991; Milgram, 1991; Moon, Kelly, & Feldhusen, 1996; Shore, Cornell, Robinson, & Ward, 1991). Their families also have unique concerns (Colangelo & Dettmann, 1983, Frey & Wendorf, 1985; Hackney, 1981; Keirouz, 1990; Moon, Jurich, & Feldhusen, 1998) that can be addressed through family therapy (Colangelo, 1997; Colangelo & Assouline, 1993; Moon, Nelson, & Piercy, 1993; Silverman, 1993a; Wendorf & Frey, 1985). Although other mental health disciplines have been actively developing publications on counseling talented children (Genshaft et al., 1995; Kerr, 1991; Van Tassel-Baska, 1990), only a handful of papers on gifted and talented children and their families have been published in family therapy books and journals (Wendorf & Frey, 1985). In 1990, a call was issued by the editor of the *Journal of Marital and Family Therapy* for "papers on family therapy with under-represented populations, such as minorities, the handicapped, the *gifted and talented*, etc."

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(Sprenkle, 1990, p. 339, emphasis added). However, special populations have remained an under-represented category in the journal (Bailey, 1996, personal communication; Sprenkle, 1993; Sprenkle & Lyness, 1994). Few family therapists have expertise in the psychology of giftedness (Colangelo & Assouline, 1993) and little research has been conducted to determine the effectiveness of family therapy with talented children and their families (Colangelo & Assouline, 1993; Colangleo & Dettmann, 1983; Moon et al., 1996; Moon, Nelson, & Piercy, 1993).

To work effectively with families of talented children, therapists need to understand the unique needs, resources, and stresses common to these children and their families. This paper was written to address the gap in the family therapy literature on gifted and talented children with their families. Its purpose is to provide to family therapy clinicians and researchers a review of the literature for family therapy theory, research, and practice. The paper shares knowledge developed in the fields of special education, educational psychology, school psychology, and counseling psychology with family therapists to encourage future collaborative practice and research related to talented children and their families among these groups of professionals.

Conceptualizations of Giftedness

Conceptualizations of giftedness have been developed within several different research traditions; each tradition examines giftedness from a different perspective (Gardner, 1983; Tannenbaum, 1986). Some theorists have synthesized the evidence accumulating from several research traditions into integrated conceptualizations of giftedness (Gardner, 1983; Neisser et al., 1996). A summary of current approaches to studying and conceptualizing giftedness follows.

Biological

Researchers using this approach attempt to identify the genetic, neurological and biochemical underpinnings of giftedness. Neurologists examine structural and biochemical differences in the brains of talented and nontalented individuals using techniques such as EEGs, average evoked potentials, brain imaging, and the study of individuals with damage to specific areas of the brain (Eysenck & Barrett, 1993). Basic neurological research has been used as a source of evidence by theorists such as Gardner (1983) in developing conceptions of giftedness.

Geneticists explore the relative contributions of genetic and environmental influences to the manifestation of high-level abilities (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990; McGue, Bouchard, Iacono, & Lykken, 1993;

Plomin, 1997; Thompson & Plomin, 1993). The most researched trait in the behavioral genetic field is IQ, and the research conducted on IQ by behavioral geneticists suggests that about half of the variance in IQ scores in the general population is due to heredity and the other half to environment (Plomin, 1990, 1997). Work on genetic factors influencing high intelligence is in its infancy but suggests that genetic factors operate at the high end of the intelligence distribution in much the same way as for the rest of the distribution (Plomin, 1997).

Behavioral genetic research has also provided evidence of the importance of family environments in explaining the variance in children's IQ scores. Behavior geneticists believe that similarities in IQ among children in the same family are due primarily to genetic factors and *shared environmental factors*. However, the influence of shared family environment seems to wane as children age, and it disappears completely by adulthood. The most lasting impact of the family environment on children appears to come through what behavioral geneticists called *nonshared environmental factors* — environmental influences that are not shared by members of the same family (Plomin, 1997). Nonshared environmental influences appear to flow, in part, from reciprocal interactions between children and their environments—i.e., these influences are actively elicited by children as they interact with family members (Plomin, 1997). This line of research suggests that a systemic perspective is needed to understand the development of giftedness.

Psychosocial

Researchers in this tradition usually are educators or educational psychologists. They identify the intrapersonal, interpersonal, and environmental characteristics associated with gifted performance in specific domains of human endeavor (Bloom, 1985; Cox, 1926; Gardner, 1983; Simonton, 1994). Their conceptualizations suggest that giftedness emerges when moderate levels of intellectual ability (e.g., an IQ greater than 120) are combined with other factors such as creativity, motivation, positive self-concept, environmental support, and chance factors (Feldhusen, 1995; Renzulli & Reis, 1985; Tannenbaum, 1986). These theorists use a variety of sources of evidence to conceptualize eco-systemic models of talent development. Their work often focuses on ways that abilities can be converted into demonstrated talents through environmental intervention (Feldhusen & Jarwan, 1993). The identification of giftedness in this tradition usually requires multiple, domain-specific measures of talent (such as test scores, behavioral checklists, and portfolios of completed work) collected from multiple sources (frequently students, parents, and teachers) (Gagne, 1993). Most public school programs for gifted and talented students identify intellectual, academic, and/or creative giftedness through this type of broad-based approach.

Cognitive

Scientists working from this perspective are usually psychologists. They focus on the cognitive abilities underlying gifted performance. Within the cognitive approach, psychometric theorists use psychological instruments such as intelligence and aptitude tests to assess cognitive abilities and identify talent. Most psychologists agree that intelligence tests provide reliable and valid measures of important mental processing abilities that have predictive validity for school performance (Neisser et al., 1996). However, intelligence tests have been criticized for measuring only a narrow range of intellectual abilities (Brown, 1989; Feldhusen & Goh, 1995; Haensley & Reynolds, 1989; Hocevar & Bachelor, 1989; Sternberg, 1986), many of which are unrelated to real world activities.

After several decades of development, creativity testing is even more controversial than intelligence testing (Crammond & Urban, 1995). There appear to be some mental processing abilities not highly correlated with intelligence that facilitate creativity, such as divergent thinking (Wallach, 1985), ideational fluency (Csikszentmihalyi, 1990), and problem-finding skill (Brown, 1989; Getzels & Csikszentmihalyi, 1979). However, the testing of creative cognition remains primitive relative to intelligence testing (Michael & Wright, 1989). Most existing creativity tests have questionable reliability and validity and are difficult to administer and score (Callahan, 1991; Feldhusen & Goh, 1995).

Much of the research in the field of gifted and talented studies has used cognitive psychometric definitions of giftedness (high score on an intelligence, creativity, achievement, or aptitude test) to identify gifted children. Terman's (1925) seminal longitudinal study of intellectually gifted youth used a cognitive approach to identify intellectually gifted children (a high score on the Stanford Binet intelligence tests). The Study of Mathematically Precocious Youth (Stanley & Benbow, 1986) uses high scores by 12-and 13-year-olds on the Scholastic Aptitude Test (SAT) to identify adolescents with exceptional mathematical and verbal reasoning ability.

The cognitive approach has expanded in recent years to include cognitive abilities beyond those measured by existing psychometric instruments. For example, Sternberg (1986) has proposed that intelligence includes three types of abilities: analytic, synthetic, and practical. Only analytic abilities are assessed by current intelligence tests (Sternberg & Clinkenbeard, 1995). Similarly, Gardner (1983) has postulated seven discrete intelligences: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, intrapersonal, and interpersonal. Existing intelligence tests tap aspects of the linguistic, logical-mathematical, and spatial intelligences but provide little information on the remaining intelligences. The work of these scholars has been valuable in broadening conceptions of giftedness among researchers, educators, and clinicians.

In this paper the cognitive approach will be utilized to define giftedness because the cognitive perspective has been used to identify giftedness in most of the existing research literature and has the most heuristic value of therapy. *Gifted children* will be broadly defined as children who have been identified as being in the top 5-10% of the population in intellectual and/or creative ability through psychological testing and/or observation of behavioral characteristics. *Talented children* will be defined as children who have been identified, through domain-specific testing, behavioral checklists, and/or demonstrated performance, as being in the top 5-10% of the population in a specific talent domain such as music, art, or mathematics.

Characteristics of Gifted Children and Their Families

Characteristics and Needs of Intellectually Gifted Children

Historically, the field of gifted education has focused a great deal of attention on describing the unique characteristics of intellectually gifted children. Pioneers such as Lewis Terman (Burks, Jensen, & Terman, 1930; Terman, 1925) and Leta Hollingworth (1926) produced elaborate descriptions of the behavioral characteristics of such children. More recently, scales have been developed to quantify the behavioral characteristics associated with intellectual giftedness (Feldhusen, Hoover, & Sayler, 1990; Renzulli, Smith, Callahan, White & Hartman, 1977). The characteristics of intellectually gifted children have been used as a basis for creating special programs in school settings that create an optimal match between the characteristics of the children and the instructional environment (Maker & Nielson, 1996; Van Tassel-Baska, 1994) and for recommending specialized counseling services for gifted youth (Moon, Kelly, & Feldhusen, 1997).

Cognitive Characteristics. Intellectually gifted children usually have the following cognitive characteristics: early language interest and development, large vocabularies, voracious reading habits, excellent memory, large knowledge bases, curiosity, ability to manipulate abstract symbol systems, ability to learn new material very quickly, and advanced understanding of principles and relationships (Baska, 1989; Tuttle & Becker, 1983). Naturally, a particular child will not display all of the listed characteristics all of the time. However, in most cases the majority of these characteristics will be present and several of the behaviors will have been displayed from a very young age.

Regular educational programming is often not well-suited to the cognitive characteristics of intellectually talented youth. Gifted youth need special educational services such as enrichment (Feldhusen & Kolloff, 1986; Renzulli & Reis, 1985), acceleration (Benbow, 1986), individualization (Feldhusen 1986; Treffinger, 1986), and domain-specific talent development programs (Feldhusen, 1995; Gagne, 1985; Moon, Feldhusen, Powley, Nidiffer, & Whitman, 1993) in order to develop their full potential. Much of the energy of the field of gifted education has gone into developing differentiated curricula that meet the unique learning needs of intellectually, academically, and creatively gifted children (Maker & Nielson, 1996; Van Tassel-Baska, 1994). Numerous models for gifted and talented programs have also been developed and implemented in both school and community settings (Maker & Nielson, 1995; Renzulli, 1986). Gifted children who are not receiving appropriate educational services are at risk for the development of social and emotional problems. Family therapists need to be aware of the educational needs of gifted and talented students, prepared to advocate better educational programming in local school systems for their clients, and informed about the community programs that serve talented children in their area.

Affective Characteristics. There is considerable variation in the affective characteristics of intellectually gifted children. Although there are no affective characteristics universally or uniquely associated with intellectual giftedness, certain affective traits that have been found to be consistently associated with giftedness can create psychosocial vulnerabilities for gifted children. Examples of potentially troublesome affective traits cited in the literature as typical of gifted children are a heightened sense of justice, excessive altruism and idealism, sensitivity, intensity, early concern about death, high expectations, excessive self-criticism, pressure to meet external expectations, perfectionism, difficulty coping with failure, existential depression, high levels of energy, and strong attachments and commitments (Baker, 1996; Ford, 1989; Kitano, 1990; Lovecky, 1992; Roberts & Lovett, 1994; Sowa, McIntire, May, & Bland, 1994; Webb, 1993). Family therapists need to be aware of the affective characteristics associated with giftedness in order to facilitate healthy social and emotional adjustment in their clients and understand the ways in which the presence of a gifted child may create unique challenges for families.

Characteristics of Creatively Gifted Children

Much less is known about creatively gifted children than is known about intellectually gifted children. Many studies of gifted children do not distinguish one population from the other and few studies have focused specifically on creatively gifted children. Most creativity researchers believe that there is a relationship between intelligence and creativity (Haensley & Reynolds, 1989; Hayes, 1989; Starko, 1995; Tardiff & Sternberg, 1988). The most accepted theory of that relationship is the "threshold theory," which holds that a certain threshold level of intelligence (usually placed at an IQ greater than 120) is required for high-level creative performance, but that above that threshold IQ level there is no relationship between intelligence and creativity—i.e., higher intelligence is not necessarily associated with higher levels of creative performance (Starko, 1995). What is important clinically are the characteristics of creatively gifted children that may create social or emotional stress. A description of those unique characteristics follows.

Cognitive Characteristics. In children, creativity is usually identified by a combination of cognitive, personality, and performance indicators. For example, a child who scores well on a figural test of divergent thinking, who is nonconformist, and who has demonstrated talent for creating original art works would be considered creatively gifted. Cognitive characteristics associated with creativity include intelligence, problem-finding ability (the ability to identify and formulate important problems within a domain), divergent thinking ability (the ability to generate many appropriate responses to an open-ended stimulus), flexibility, metaphoric thinking, associative thinking, visualization, imagination, enjoyment of novelty, logical thinking, evaluative skill, and originality (Starko, 1995; Tardiff & Sternberg, 1988; Woodman & Schoenfeldt, 1989). These characteristics enhance the ability of the child to solve problems and/or create original products. However, they can also bring children into conflict with their environments. For example, it is common for schools to value convergent thinking over divergent thinking, verbal and symbolic learning more than visual/spatial learning, and conformity rather than originality and imagination. When the cognitive characteristics of children conflict with the value systems of their environments, social or emotional adjustment problems may develop.

Affective and Personality Characteristics. Many affective and personality characteristics have been found to be consistently associated with creative performance across domains such as literature, science, and the visual arts. These characteristics include willingness to take risks, perseverance and task commitment, intrinsic motivation, openness to experience, tolerance for ambiguity, intuitive powers, independence, questioning of norms and assumptions, and nonconformity (Amabile, 1990; Starko, 1995; Sternberg, 1988; Tardiff & Sternberg, 1988; Woodman & Schoenfeldt, 1989). Again, these characteristics can bring children into conflict with their environments. Teachers tend to dislike children who display the personality traits associated with creativity (Westby & Dawson, 1995). They prefer students with traits such as conformity and unquestioning acceptance of authority, probably because those traits make children easier to manage in group settings. Similarly, parents may have difficulty with children who are continually taking risks or questioning their authority.

Characteristics of Families of Gifted Children

Research on families of gifted children suggests that these families have unique values, concerns, and stressors (for a review see Moon et al., 1998). A brief summary of unique characteristics of these families relevant to family therapy follows.

Values and Discipline. Families with *high-achieving* and/or *high-IQ* gifted children tend to be child-centered, set high standards for education and achievement, expect conformity to conventional values, value intellectual and cultural activities, and nurture close, supportive family relationships (Bloom, 1985; Friedman, 1994; Moon et al., 1998). Parents in these families tend to perceive themselves as successful in their parental roles and to be perceived positively by their children (Strom, Strom, Strom, & Collinsworth, 1994). In contrast, families of *creatively* gifted children have been shown to value independence (Getzels & Jackson, 1962; Moon et al., 1998; Robinson & Noble, 1991) and nonconformity (List & Renzulli, 1991). Parents of these children also tend to have more unconventional and permissive parenting styles and to be open to varied expressions of thoughts and feelings. It is important for family therapists who work with gifted and talented children to assess family values and to be alert for ways that value conflicts between parent and child or family and school may be contributing to distress.

Roles and Relationships. In general, families of gifted children have been found to have close, supportive relationships, clear roles, and an empowering, child-centered culture (Bloom, 1985; Cornell & Grossberg, 1986). They exhibit the high levels of bonding and flexibility that characterize resilient and self-actualizing families (Bland, Sowa, & Callahan, 1994; Frey, & Wendorf, 1985; Jenkins-Friedman, 1991). Exceptions to these generalizations have been noted among low-income, creative, underachieving, minority, and clinical populations of gifted children (Exum, 1983; Goertzel & Goertzel, 1962; Prom-Jackson, Johnson & Wallace, 1987; Reis, Herbert, Diaz, Maxfield, & Ratley, 1995; Rimm, 1995). These families are more likely to experience stress and to be disorganized, conflicted, and/or dysfunctional. They are also more likely to seek and benefit from family therapy.

Special Populations

Most of the research on intellectually and creatively gifted children and their families has been conducted with samples of children from white, middle-class, two-parent families. Much less is known about the characteristics of gifted children who do not fit this profile. The existing evidence suggests that the cognitive characteristics of highly intelligent children are fairly similar across ethnicities and cultures, but the affective and social characteristics vary considerably with the cultural context of the student (Ford, 1996; Plucker, 1996; Steinberg, 1996). Subpopulations of gifted children that tend to be at risk for both underperformance in school and social/emotional adjustment difficulties include children from lower socioeconomic backgrounds (Friedman, 1994; Van Tassel-Baska, Patton, & Prillaman, 1991), children from single-parent families (Gelbrich & Kare, 1989), African-Americans (Ford, 1996), the highly gifted (an IQ greater than three standard deviations above the mean) (Janos & Robinson, 1985), and the twice-exceptional (e.g. gifted *and* learning disabled, gifted *and* attention deficit disordered, etc.) (Baum 1994; Baum & Owen, 1988; Nielsen, Higgins, Hammond, & Williams, 1993; Nielsen, Higgins, Wilkison, & Webb, 1994).

Social/Emotional Adjustment

Most studies comparing gifted children with children of average intelligence or with norms on instruments designed to measure components of psychological adjustment have found that the gifted children are as well or better adjusted emotionally than other children during the elementary school years (Cornell, Delcourt, Bland, Goldberg, & Oram, 1994; Hoge & Renzulli, 1993; Janos & Robinson, 1985). However, clinical sources have suggested that giftedness creates certain psychological vulnerabilities that place a substantial minority of young gifted children at risk for difficulties with emotional adjustment (Genshaft et al., 1995; Silverman, 1993b; Webb, Meckstroth, & Tolan, 1982). Highly intellectually gifted students appear to be particularly at risk for psychological difficulties because they are so different from the norm (Robinson & Noble, 1991). The brighter the children are, the more they tend to struggle with feelings of isolation and loneliness.

The adolescent years appear to be a time of particular vulnerability for many intellectually talented youth (Robinson & Noble, 1991). For example, Baker (1996) found that exceptionally gifted (high SAT scores) and academically talented (high class rank) adolescents experience more stress than their less talented peers around issues such as feeling pressured to do well in school, needing to be exceptional/best, and being expected to know a lot. Gifted adolescents have also been found to experience conflicts between achievement and affiliation needs (Clasen & Clasen, 1995; Gross, 1989; Kramer, 1991). The adolescent peer culture is generally not supportive of academic achievement (Clasen & Clasen, 1995, Steinberg, 1996). Gifted adolescents may develop coping strategies to deal with anticipated peer rejection that involve denying their talents or underachieving in school (Clasen & Clasen, 1995; Cross, Coleman, & Terhaar-Yonkers, 1991). Alternatively, they may choose to achieve at the expense of social acceptance or experience considerable ambivalence as they vacillate between acceptance and rejection of their talents (Clasen & Clasen, 1995).

Research on social and emotional adjustment in gifted individuals in relation to anxiety, depression, and suicidal ideations is mixed. Kaiser and

Berndt (1985) found that 12% of gifted students reported experiencing depression, anger, and loneliness. However, Baker (1995) found no differences in depression and suicidal ideation among academically gifted adolescents, and adolescents average in academic performance. In contrast, several studies have documented a relationship between giftedness and depression and/or suicide (Delisle, 1986; Feldhusen & Nimlos-Hippen, 1992; Leroux, 1986). Conceptual comparisons between identified risk factors for adolescent suicide and the characteristics of gifted adolescents reveal disturbing similarities, and limited empirical evidence suggests that there may be a higher than average percentage of gifted students among completed (as opposed to attempted) suicides (for a review see Dixon & Scheckel, 1996).

Social and emotional adjustment is directly related to self concept. The first studies on the self concepts of gifted students focused on global self concept and found that gifted children tend to have higher self concepts than their less gifted peers (for a review see Hoge & Renzulli, 1993). Studies of the dimensionality of self concept have found that self concepts of gifted students differ across domains such as academic, athletic, social, and physical (Brounstien, Holahan, & Dreyden, 1991; Cornell et al., 1990).

Research on the social characteristics of intellectually gifted children is also mixed. Group comparison studies suggest that young gifted children are well-liked, get along well with their peers, and have better than average social adjustment (Cohen, Duncan, & Cohen, 1994; Janos & Robinson, 1985; Robinson & Noble, 1991). Gifted students have also been found to have greater social competence and more valued positions in the peer network than other children. Yet, clinicians who have worked with this population paint a different picture. Intellectually gifted children who are seen in clinical settings often seem to feel isolated and friendless and to have difficulty with interpersonal relationships (Genshaft et al., 1995; Silverman, 1993b; Webb et al., 1982). Highly intellectually gifted children (IQ greater than three standard deviations above the mean) are more likely to have problems with social adjustment than moderately gifted children (Dauber & Benbow, 1990; Janos, Marwood, & Robinson, 1985; Janos & Robinson, 1985; Robinson & Noble, 1991). Other groups of gifted students who may be at risk for problems with social adjustment include gifted children with high levels of verbal ability (Dauber & Benbow, 1990; Swiatek, 1995), those who feel different (Freeman, 1979), gifted females (Kramer, 1991; Luftig & Nichols, 1990), and as noted above, adolescents. Inadequate school environments can also precipitate social and emotional problems in intellectually gifted, creatively gifted, and/or academically talented students.

The existing research literature on the social and emotional characteristics of gifted children has many limitations. Except with respect to the literature on self concept, studies tend to be isolated, rather than programmatic, and are methodologically simplistic. Samples have been drawn almost exclusively from middle to high socio-economic status, white cultures, and have defined giftedness by high scores on tests of intelligence or achievement and/or by participation in a gifted program, so the findings cannot be generalized to other populations of gifted children. Few studies have focused on differences between creatively and intellectually gifted children or between children who are talented in different domains such as science, the humanities, or arts. Little is known about the ways that the social and emotional adjustment of gifted children changes over time or about the efficacy of interventions designed to enhance the social and emotional adjustment of gifted children. The discrepancies between the clinical and research literatures may be due, in part, to these inadequacies in the empirical literature. Alternatively, the clinical population of gifted children may differ in important, and as yet undetermined, ways from the nonclinical population. In either case, the clinical literature suggests that there is a substantial minority of gifted children who have difficulties with psychosocial adjustment that are related to their giftedness and could be alleviated by family therapy.

Implications for Family Therapy

Since family therapists are trained to view presenting problems from an eco-systemic perspective, they are especially well equipped to work with gifted children and their families. The presenting problems of gifted children can be characterized as endogenous and/or exogenous in origin (Webb, 1993). Endogenous problems are grounded in the characteristics of the child. An example of an endogenous problem is internal dyssynchrony — a discrepancy between rates of development within an individual child such as might be experienced by a child with precocious intellectual development coupled with below-average emotional development. Exogenous problems, on the other hand, are created or exacerbated by the individual's environment. Many of the social and emotional problems experienced by gifted children are exogenous in origin — i.e., they stem from lack of understanding and support, or even outright hostility, from the child's social environments. The eco-systemic perspective utilized by most family therapists provides a framework for examining the complex interactions between the endogenous and exogenous factors that influence social and emotional adjustment in gifted children and their families. The purpose of this section of this paper is to review research related to three common presenting problems that bring families of gifted children to family therapy and to suggest eco-systemic treatment approaches for each area of concern.

Parent and Family Stress

Definition and Etiology. Parents of gifted children have a number of unique concerns about their children's development that can cause them considerable parenting stress (Keirouz, 1990). These concerns include: asynchronous development (Genshaft et al., 1995), the meaning and impact of having a child labeled gifted by the school (Colangelo, 1997; Cornell, 1984), feelings of parental inadequacy (Colangelo & Dettmann, 1983; Hackney, 1981; Silverman, 1993a; Wendorf & Frey, 1985), helping the child balance social/emotional and cognitive development (Windecker-Nelson, Moon, & Melson, 1996), and confusion about the role they should play when schools are not meeting their child's needs (Colangelo & Dettmann, 1983; Hackney, 1981).

Giftedness can be an idiosyncratic stressor on the family system that creates pressure for adaptions in family lifestyle (Moon et al., 1998). In some families the giftedness of one or more children becomes an organizer for understanding behavior and structuring family activities (Colangelo & Assouline, 1993). The tendency of giftedness to organize the family system can be stressful if it overwhelms family resources, skews family relationships, or creates pressure to change communities or lifestyles in order to maximize the potential of the gifted child (Bloom, 1985; Hackney, 1981; Moon et al., 1998).

In some cases, the presence of a gifted child can have a negative effect on family relationships. For example, gifted children can easily assume an authoritative, parental role, gaining power in the system at the expense of the parents (Cornell, 1984; Hackney, 1981). Gifted children are also easily parentified in families where one parent is absent through death, divorce, work, etc. When parental perceptions of the child's giftedness differ (Cornell, 1984; Keirouz, 1990) or one or both parents are less gifted than their child, or parents have different values systems for issues like creativity, conformity, or achievement (Rimm, 1995), parental conflict may ensue. Weakness in the marital subsystem and family conflict are common in families of gifted children who are underachieving in school (Frey & Wendorf, 1985; Rimm, 1995) or who have AD/HD (Moon, Zentall, Grskovic, & Hall, 1996; Moon, Zentall, Grskovic, Hall, & Stormont-Spurgin, 1997).

Suggested interventions. Psychoeducation is one of the best ways to alleviate parental concerns stemming from the unique developmental issues associated with raising a gifted child. Self-help books that might be recommended to parents include *Guiding the Gifted Child* (Webb et al., 1982), *Keys to Parenting the Gifted Child* (Rimm, 1994), *Parents' Guide to Raising a Gifted Child* (Alvino, 1985), and *Why Bright Kids Get Poor Grades and What You Can Do About It* (Rimm, 1995). Self-help books for gifted children that can also be helpful to parents include the *Gifted Kids Survival*

Guide series (Delisle & Galbraith, 1987; Galbraith, 1983, 1984; Galbraith & Delisle, 1996), *Gifted Kids Speak Out* (Delisle, 1987), and *Perfectionism: What's Bad About Being Too Good?* (Adderholt-Elliot, 1987). A national organization called SENG (Supporting the Emotional Needs of the Gifted) has been active in developing guided discussion groups for parents of gifted children (Webb & DeVries, 1993), and both SENG and NAGC (the National Association for Gifted Children) have strands for parents at their annual conferences. Family therapists can lead SENG discussion groups, create their own support groups for parents of gifted children, or encourage parents to attend existing groups in their region.

An ecological perspective is essential when conducting family therapy with families of gifted children because external systems such as the school, the neighborhood, and peer networks can have a tremendous impact on both the child and the family (Moon et al., 1998). Schools that lack appropriate programming are a common stressor on the family of a gifted child. Family therapists working with families whose children are not receiving an appropriate education may need to help parents advocate more appropriate educational programming for their child. When parents are feeling pressured to move to a new neighborhood to foster talent-development opportunities for their child, family therapists can help evaluate all the ramifications of such a decision. When peer rejection is a concern, family therapists can help families develop a supportive emotional environment to counteract the negative effects of peer rejection and can encourage the family to provide opportunities for the child to associate with more similar peers through participation in community- or university-based programs for talented youth.

Family therapists need to intervene with families of gifted children in ways that will build satisfying couple and family relationships across the life span and help all family members to develop their talents. One way to work with families of highly gifted adolescents is through an integrative approach to family therapy (Moon, Nelson, & Piercy, 1993), using multiple frameworks such as *family life cycle* (Carter & McGodrick, 1988), *structural-strategic* (Haley, 1988; Minuchin, 1974; Minuchin & Fishman, 1981), and the *psychology of talent development* (Bloom, 1985; Colangelo & Davis, 1997; Csikszentmihalyi, Rathunde, & Whalen, 1993; Tannenbaum, 1983). The family FIRO model (Doherty & Colangelo, 1984; Doherty, Colangelo, & Hoavander, 1991) has also been used for case conceptualization and brief intervention with families of gifted children (Colangelo, 1988). This model categorizes family issues into a hierarchy of inclusion, control, and intimacy. Resolution of issues at the lower levels of the hierarchy are targeted for intervention before resolution of issues at the higher levels. The family FIRO model helps therapists to categorize the concerns of families of gifted children and prioritize them for treatment (Colangelo, 1988).

Underachievement

Definition and Etiology. Underachievement is defined as a discrepancy between a child's performance and some indicator of ability (Raph, Goldberg, & Passow, 1966), where opportunity to learn and motivation are already present. In determining whether a child is underachieving, it is necessary to distinguish between underachievement and nonproductivity. A nonproductive child is mentally healthy but simply chooses to underperform; in contrast, an underachieving child is upset because a commitment and an effort to perform are present, yet he or she is not doing well (Delisle, 1992). Underachievers, but not underperformers, tend to develop poor academic self concepts. Both underachievers and underperformers can benefit from family therapy.

Underachievement in gifted children can be caused or exacerbated by both endogenous and exogenous factors (Silverman, 1989; Webb, 1993). Endogenous factors that can contribute to underachievement include learning disabilities, attention deficit/hyperactivity disorder, hearing impairment, nontraditional learning styles, and emotional problems (Dowdall & Colangelo, 1982; Gallagher, 1991; Silverman, 1991). The most critical exogenous systems in underachievement are the family, the school, and the peer group. Family characteristics that have been found to be associated with underachievement include: dependence upon the mother; a rejecting father; weak or conflicted relationships between parents; unrealistic parental goals; inconsistent parenting; unrewarded achievement; emotional problems within family members; poor family relationships; lack of parental involvement in schools; parental feelings of inadequacy or threat due to their child's gifts; and an authoritarian parenting style (Bricklin & Bricklin, 1967; Daniel, 1960; Dowdall & Colangelo, 1982; Kimball, 1953; McGillivray, 1964; Morrow & Wilson, 1961; Pierce & Bowman, 1960; Raph, Goldberg, & Passow, 1966; Rimm, 1991; Rogers & Nielson, 1993). However, the most common exogenous causes of underachievement of half of all gifted children are boredom and anti-intellectual peer pressure (Gallagher, 1991). Mind-numbing boredom has been said to account for the underachievement of half of all gifted students (Marland, 1972; National Commission on Excellence in Education, 1983). There are still many school districts where no special programming for gifted students exists or where the programming that does exist is not a good fit for a particular child's talents. When gifted and talented children are not challenged in school, underachievement and nonproductivity are common. In addition, the American peer culture is generally not supportive of achievement, especially in adolescence (Gallagher, 1991; Steinberg, 1996). Anti-academic peer groups can influence gifted students to minimize their talents or choose to underachieve in order to be accepted by their peers (Clasen & Clasen, 1995).

Intervention. In working with families of underachievers, the first step in helping them is to identify the area of underachievement, the contexts in which it occurs, and possible endogenous and exogenous factors that are contributing to the underachievement. The second step is to develop a plan for intervention using an eco-systemic theoretical framework. The final step is to ensure that the family is able to negotiate affiliation and structure functions so that the family environment is positive and supportive.

Assessment of underachievement is complex and may require a multidisciplinary team of professionals trained in diagnostic techniques. Multiple methods of assessment, including testing and clinical interviews, are needed to identify endogenous and exogenous factors that may be contributing to the underachievement. Assessment of some of the endogenous factors contributing to underachievement, such as hidden learning disabilities or AD/HD, may require referral to a neurologist, clinical psychologist, school psychologist or other professional with specialized training in psychological assessment.

Most families who come to therapy with an underachieving child come with a history of pain, conflict, frustration, and helplessness. There is some evidence that families can help their children reverse patterns of underachievement when they support out-of-school interests, stay calm, and continue to encourage their child in spite of academic failure (Emerick, 1992). It is important for family therapists to understand the history of perceptions of failure of both the child and the parents in relation to the problem, to find out what has been tried but has not worked, and to help the child work with his or her parents to find some *new* things to try. The first author has found that a solution-focused approach (Miller, Hubble, & Duncan, 1996), which engages the child in setting and achieving his or her own goals for school performance while simultaneously encouraging the parents to support the child's efforts, is effective in reversing underachievement.

Environmental and social interactions with gifted underachievers include doing what is necessary to ensure that the school provides appropriate guidance and that the child is placed in learning situations with intellectual peers who can work at meaningful tasks in a dynamic, complex, challenging classroom environment (Whitmore, 1980). If family dysfunction is contributing to underachievement, standard family therapy interventions for improving family functioning can be used. The first author has found structural-strategic interventions (Haley, 1988; Minuchin & Fishman, 1981) helpful in addressing dysfunctional interaction patterns that have developed as families attempted to cope with the stress of underachievement.

Social, behavioral interventions are a hallmark of family therapy and are most effective in reversing underachievement when they target multisystem change and when they stimulate personal growth within social contexts (Rimm, 1995). Interpersonal skills need to be nourished (e.g., the ability to generate and maintain positive relationships within the family and outside of it) because they have great impact on academic achievement and can prevent the deterioration in self-esteem and learned helplessness that can develop in children with poor grades. Personal skills (e.g., locus of control) also must be nourished because they can have an even greater influence on outcome than family, school, or teacher, especially in adolescence (Lafoon, Jenkins-Friedman, & Tollefson, 1989).

In summary, family therapists can help underachieving family members if they identify target problem areas associated with low performance in one or more talent domains (Green, 1989), design interventions that recognize how a person operates within multiple ecological systems (Butler-Por, 1987; Gurman, 1970; Rimm & Lowe, 1988; Whitmore, 1980; Zuccone & Amerikaner, 1986), and address needs in affective, cognitive, and behavioral domains (Pirozzo, 1982; Supplee, 1990).

Dual Exceptionalities

Families commonly seek therapy for children who are both gifted and disabled. Intellectually gifted individuals with specific learning disabilities or developmental challenges need sensitive interventions from family therapists because they are among the most misjudged, misunderstood, and neglected people in our communities (Boodoo, Bradley, Frontera, Pitts, & Wright, 1989; Minner, 1990; Suter & Wolf, 1987; Waldron, Saphire, & Rosenblum, 1987). Their superior intellect, combined with their inability to perform in one or more areas, can make them vulnerable to social/emotional problems (Yewchuk, 1983). In fact, the entire family system may be experiencing grief over the ongoing and ambiguous loss of normalcy that results from chronic disability. These families often feel helpless and frustrated.

Definition and etiology. Developmental exceptionalities include, but are not limited to, the following disorders: autistic sauvant syndrome; developmental delays or deficits (academic skills, speech, language, and motor coordination); disruptive behaviors (AD/HD, conduct disorder, and oppositional-defiant disorder); anxiety (separation anxiety, social phobia, and generalized anxiety disorder); and other childhood disorders (eating disorders, Tourettes) (Halgin & Whitbourne, 1994). The focus of this section will be on gifted children with learning disorders (LD), attention deficit/hyperactivity disorder (AD/HD), or both. Developmentally, learning disorders are defined as a specific delay, deficit, or discrepancy of two standard deviations between a person's achievement and intellectual ability. This discrepancy can be seen in one or more of the following areas: oral expression, listening comprehension, written expression, basic reading skill, reading comprehension, and mathematics reasoning or calculation (American Psychiatric Association, 1994).

The most common behavioral disorder in gifted children is attention deficit/hyperactivity disorder (AD/HD), a persistent pattern of inattention and/or hyperactivity-impulsitivity that is present in at least two settings (e.g., home and school) and interferes with social or academic functioning (American Psychiatric Association, 1994). AD/HD is known to have both neurological and psychosocial components. For the neurological aspects of this disorder, medical intervention is often warranted. For the psychological aspects (such as a disturbed family environment with inappropriate amounts or kinds of structure, closeness, and communication), family therapy is recommended.

For gifted persons with LD or AD/HD, testing profiles will reflect distinctive patterns of both consistency with giftedness criteria and inconsistency across talent areas (Barton & Starnes, 1988). Individual testing by a trained psychometrist, rather than the group testing typically offered in schools, is needed to assess dual exceptionalities. Also, multiple testing methods are needed; interpretations should be made with the child's known disabilities and talents in mind; and subtests rather than aggregate scores must be examined in order to target individual strengths and weaknesses (Moon & Dillon, 1995).

The developmental challenges facing gifted children with LD and/or AD/HD are different from those of underachieving children, because the former are presumed to have some type of organic disturbance, whereas the latter do not. However, gifted LD and AD/HD children are at risk for underachievement. They also experience considerable internal dyssynchrony and are vulnerable to problems with social and emotional adjustment. Their families are also at risk. For example, families of children with giftedness and AD/HD have been found to be more stressed than the families of children with only one of the two exceptionalities (Moon et al., 1996).

Intervention. At the outset, clinicians must understand that a family systems approach, when used alone, will not be as effective as family therapy used in conjunction with other interventions. Family therapists must work closely with other professionals in helping these children and their families. Specifically, when biological or neurological contributors are present, medical interventions may be needed along with family therapy and the family therapists will need to stay in close contact with the psychiatrist or physician prescribing the medication. For accurate assessment of neurological disabilities, referral to a specialist will be required.

Mandated special education services for severely learning-disabled gifted children usually include the development of an individual education plan (IEP) by a team of professionals including teachers, principals, school psychologists or counselors, and parents. Family therapists with clients eligible for an IEP should be invited to participate in IEP case conferences. Gifted children with AD/HD and/or mild LD are usually not eligible for mandated special education services, but they are entitled to accommodations for their disability under section 504 of the Vocational Rehabilitation Act of 1973 (P.L. 93-112) and/or the Individuals with Disabilities Act of 1990 (P.L. 101-476) (Wood & Lazzari, 1997). Family therapists can play an active role in requesting case conferences with school personnel to secure such accommodations.

In their more traditional role, family therapists can help parents to understand that gifted persons with learning disabilities do not simply lack motivation (Baum & Owen, 1988). Instead, their learning problems flow from neurological, biochemical, or physical causes. These neurological realities cannot be eliminated through a better attitude, more exposure to material, or more time on task. Nevertheless, coping strategies can be learned that maximize the child's talents and minimize his or her handicaps. A major focus of therapy needs to be on helping children and their parents to understand the child's exceptionalities and develop coping strategies that maximize the child's gifts and minimize the effects of the child's disorder. A secondary focus needs to be on the prevention or amelioration of dysfunctional family interactions related to the child's exceptionalities.

Empirical studies suggest use of interventions that address self concept (Baum & Owen, 1988; Nielson & Mortoff-Albert, 1989) and help clients to develop the following coping strategies: academic skills (Ganschow, 1985; McGuire & Yewchuk, 1996; Montague, 1991); organizational skills (Sah & Borland, 1989); and metacognitive skills (Hannah & Shore, 1995; McGuire & Yewchuk, 1996; Wong, 1982). Of these, it is believed that interventions targeted at increasing metacognitive skills may be most promising, because an increase in metacognitive skills predicts an increase in all areas of learning related to behavioral deficiencies (Howard, 1994; Manning, Glasner, & Smith, 1996; Miller, 1991). Metacognition is *the* prerequisite skill required in order to maintain control over the behaviors that lead to achieving target goals (Flavell, 1976).

The first author uses psychoeducation, solution-focused problem-solving, and structural-strategic interventions in her therapy with families of children with dual exceptionalities. She provides psychoeducation to inform the family about the typical cognitive, affective, and behavioral characteristics of twice-exceptional children and normalize the family's frustrations. Then she helps the child and family to identify areas of concern, set goals, and develop creative strategies for achieving those goals. Once some progress has been made in developing and applying effective coping strategies, she alternates 30-minute coaching sessions designed to facilitate clients' progress toward their self-elected goals with longer sessions designed to: (1) generate solutions for new areas of concern or (2) change distressing family interaction patterns through structural-strategic interventions.

Dual exceptionalities are stressful for families, and family dynamics are known to influence the outcomes associated with children who demonstrate abnormal behavior (Barkley, 1990; Polson, 1996). Family therapy is appropriate for any twice-exceptional child whose neurological or biological disorder is contributing to behavioral, affective, or cognitive problems within the family.

Conclusion

In sum, in order to work effectively with families with a talented child, family therapists need training in the unique cognitive, affective, and behavioral characteristics of gifted children and the unique family dynamics that can occur when a family contains a gifted child. Family therapy can be a powerful method of intervention with families of gifted children if family therapists are trained to assess and treat the endogenous and exogenous factors associated with social and emotional distress in these children and their families. Whatever interventions or models of therapy are used in working with families with gifted children, family therapists should do two things simultaneously: increase the likelihood that the child will be able to fulfill his or her potential and increase the mean level of family-system functioning. To effect desired changes in families with gifted children, an eclectic, eco-systemic, multidisiplinary approach to therapy is recommended. Family therapists can and should be working to strengthen relationship support systems within families of gifted children and to strengthen ties between those families and their schools and communities.

The research base on family therapy with families of the gifted is extremely limited. Programmatic research is needed to determine the models of family therapy that are most efficacious for gifted and talented clients and the interventions that are most efficacious in helping clients cope with stressors related to giftedness. Research is also needed to determine the effectiveness of family therapy with specific subpopulations such as twice-exceptional children, underachievers, minorities, females, and families in poverty. Methods for training family therapists to work with families of gifted children need to be developed and evaluated. It is hoped that this paper will stimulate the development of family therapy theory, research, and practice with families of gifted and talented children.

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